

Yale-NUS College Dining Hall Report 2015

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I'dECO, Yale-NUS Sustainability Movement



Executive Summary

The Yale-NUS College Dining Hall Report 2015 is meant to assist the dining committee in the preparation of the new dining hall and beyond.

Recommendations are divided into two categories: immediate and advanced. **Immediate** recommendations are simple to implement logistically; we wish to work with SATS and dining committee to implement these recommendations as soon as possible to minimise organisational inertia. **Advanced** recommendations are more difficult to implement and require further research; we wish to work with SATS and the dining committee to figure out what further research needs to be done to ensure their eventual successful implementation.

The following is a summary and preliminary analysis of all our recommendations:

<u>Recommendation</u>	<u>Type</u>	<u>Cost</u>	<u>Feasibility</u>	<u>Resistance</u>
Removal of Trays	Immediate	Low	Easy	Yes
Self-service	Immediate	Low	Easy	No
9-inch Plates	Immediate	Low	Easy	No
Minimising Individually Packaged Food	Immediate	Low	Easy	No
Minimising Processed Food	Immediate	Low	Easy	No
Minimising Animal-Based Products	Immediate	Low	Easy	Yes
Recycling of Oil	Immediate	Low	Easy	No
Requesting Blemished Food	Advanced	Low	Easy	No
Converting Food Waste to Fertiliser	Advanced	High	Easy	No
Order Cancellation System	Advanced	Low	Difficult	Yes
Local/Organic Food	Advanced	High	Difficult	Yes

Table 1: Summary and preliminary analysis of all recommendations.

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1. Introduction

Impetus of Report

The United Nations Environment Programme (UNEP) recognises that universities play a key role in creating a sustainable future¹. Likewise, many academics advocate for higher education to take greater leadership in sustainability².

Yale-NUS has taken some steps towards being a leader in sustainability. Our campus won the BCA Green Mark Platinum Award for its green design³, and we have an Environmental Studies department that incorporates environmental issues into the school's Common Curriculum. However, there is much room for improvement in other areas. We lack an Office of Sustainability to represent environmental concerns at higher levels of decision making, as well as a set of best practices to guide our school operations.

The Dining Hall Report is the first part of a comprehensive sustainability blueprint on all aspects of school policy and practices meant to address this gap. In this report, we study the best practices of US Colleges and provide concrete recommendations on how Yale-NUS College can move towards more sustainable dining.

¹ UNEP. (n.d). *The Environmental Education and Training Unit (EETU)*. Retrieved 15 January 2015 from <http://www.unep.org/training/programmes/gupes.asp>

² Cortese, A. D. (2003). The Critical Role of Higher Education in Creating a Sustainable Future. *Planning Higher Education*, 31(3), pp. 15-22; Sterling, S. (2004). Higher Education, Sustainability, and the Role of Systemic Learning. *Higher Education and the Challenge of Sustainability*, pp.49-70; Corcoran, P.B., Wals, A.E.J. (2004). *Higher Education and the Challenge of Sustainability*. Dordrecht: Kluwer Academic Publishers.

³ Yale-NUS College. (n.d). *Yale-NUS wins BCA Green Mark Platinum Award*. Retrieved 15 January 2015 from <http://www.yale-nus.edu.sg/newsroom/yale-nus-wins-bca-green-mark-platinum-award/>

What Is a Sustainable Food System?

A widely-used definition of sustainability is that of the Brundtland Commission, which defines *sustainable development* as “development that meets the needs of the present without compromising the ability of future generations to meet their own needs.”⁴ Using this as a guide, a sustainable food system should meet the nutritional needs of diners without being at risk of becoming untenable in the future.

Our modern food system is certainly not tenable. Singapore generated 800,000 tonnes of food waste in 2014 and recycled less than 15% of it⁵ – everything else headed for the landfill. The current landfill at Pulau Semakau is expected to be full by 2016, and while the National Environmental Agency (NEA) has plans to expand it⁶, this is only a stopgap solution.

This becomes more salient if we consider the fact that food waste is essentially precious resources produced, packaged, and transported (often between countries, in the case of Singapore) only to be thrown away. In *American Wasteland*, Jonathan Bloom offers this analogy⁷:

Go outside and turn on your car. Don't ask questions, just do it. Now walk away.

You heard me, just leave it running. Set your watch for thirty minutes. When that time is up, you can turn off your car.

While no sane person would let their car idle for half an hour, it burns through the same amount of money that we squander each day in wasted food.

At the other end of the product cycle, our modern food system is also highly unsustainable in terms of its resource consumption and pollutive impact. According to UNEP, agriculture is responsible for 70% of freshwater and 21% of fossil fuel use, and contributes more than 30% of greenhouse gas emissions

⁴ International Institute for Sustainable Development. (n.d). *What is Sustainable Development?* Retrieved 14 May 2015 from <https://www.iisd.org/sd/>

⁵ National Environmental Agency. (2014). *Singapore Waste Statistics 2014*. Retrieved 28 June 2015 from <http://www.zerowastesg.com/2015/03/18/singapore-waste-statistics-2014/>

⁶ Zengkun, F. (2013, August 2). *NEA plan seeks to limit damage from landfill expansion*. Retrieved 28 June 2015 from http://wildsingaporenews.blogspot.sg/2013/08/nea-plan-seeks-to-limit-damage-from.html#.VY_KVPmqgko

⁷ Bloom, J. (2010). *American Wasteland*. Cambridge, MA: Perseus Books Group.

globally. It is also responsible for 80% of deforestation, and continues to degrade 2 to 5 million hectares of arable land annually.⁸

We are already beginning to perceive the repercussions of our activities. 700 million people suffer from water scarcity today, and it is estimated that almost half the world's population will be living in areas of high water stress by 2030.⁹ Climate change brought about by greenhouse gas emissions has also resulted in more intense wildfires, droughts, outbreaks of disease, floods, and typhoons.¹⁰ These costs are disproportionately inflicted on developing countries, even though the rich world disproportionately benefits from the activities that cause them, making environmental degradation an issue of social justice at its heart.¹¹

We may also contest the notion that our modern food system truly meets our needs. While food is certainly plentiful and cheap, it does not necessarily leave us better off. David Kessler, author of *The End of Overeating*, writes that most of what we eat today is overloaded with fat, salt, and sugar, and bears little resemblance to what exists in nature. We are trapped in a culture of what he terms “conditioned hypereating”, where highly palatable foods motivate excessive eating that we find difficult to control, leading to skyrocketing obesity rates and healthcare costs.¹² Besides encouraging overeating, these unhealthy, processed foods also have the heaviest environmental impacts, according to a 2014 study published in the *Journal of the Academy of Nutrition and Dietetics*.¹³

At the same time, eating healthily has become much harder, even in developing countries. Research by the University of Cambridge found that in the UK, consuming healthy foods can cost three times as much as consuming unhealthy foods, and the price gap is only widening.¹⁴ A survey conducted

⁸ UNEP. (n.d). *Agriculture and Food*. Retrieved 28 June 2015 from

<http://www.unep.org/resourceefficiency/Home/Business/SectoralActivities/AgricultureFood/tabid/78943/Default.aspx>

⁹ United Nations. (n.d). *Water Scarcity*. Retrieved 28 June 2015 from <http://www.un.org/waterforlifedecade/scarcity.shtml>

¹⁰ Oxfam. (n.d). *5 natural disasters that beg for climate action*. Retrieved 28 June 2015 from <https://www.oxfam.org/en/campaigns/5-natural-disasters-beg-climate-action>

¹¹ Shah, A. (2012). *Climate Justice and Equity*. Global Issues. Retrieved 28 June 2015 from <http://www.globalissues.org/article/231/climate-justice-and-equity>

¹² Kessler, D. (2009). *The end of overeating: taking control of the insatiable American appetite*. Emmaus, PA: Rodale.

¹³ Masset, G., Soler, L., Vieux, F., Darmon, N. (2014). Identifying Sustainable Foods: The Relationship between Environmental Impact, Nutritional Quality, and Prices of Foods Representative of the French Diet. *Journal of the Academy of Nutrition and Dietetics* 114(6) pp. 862-869.

¹⁴ Jones, N., Conklin, A., Suhrcke, M., and Monsivais, P. (2014). The Growing Price Gap between More and Less Healthy Foods: Analysis of a Novel Longitudinal UK Dataset. *PLoS ONE*, 9(10), e109343, doi:10.1371/journal.pone.0109343

by the dining advisory committee in March 2015 on dining hall food found that the lack of appetising and varied healthy options was a common complaint by Yale-NUS students.¹⁵

An Issue of Values

While reducing systemic inefficiencies can certainly go a long way to reducing the unsustainability of our modern food system, the root cause of the problem is one of values. On one hand, we have stopped perceiving food as sustenance, but sources of self-indulgence, pleasure, and reward.¹⁶ On the other, we have lost a sense of appreciation for the amount of work and resources that goes into producing food.¹⁷ As a result, we not only demand too much of the most energy, water, and carbon intensive foods, but also waste copious amounts of it.

As such, our solutions should collectively aim not just to reduce the environmental impact of dining hall operations, but also be a source of education in themselves in recalibrating how we value our food, and empowering the imagination of a truly sustainable food system in the future.

¹⁵ Unfortunately, the results of the survey are not openly available.

¹⁶ Kessler, D. (2009). *Op. cit.*

¹⁷ Bloom, J. (2010). *Op. cit.*

2. Immediate Recommendations

The next two sections list our recommendations for the new dining hall. **Immediate** recommendations are simple to implement logistically; we wish to work with SATS and dining committee to implement these recommendations as soon as possible to minimise organisational inertia.

2a) Removal of Trays

We propose that the dining hall abstain from the purchase of trays for the dining hall next semester. Trayless dining not only saves costs in terms of purchased tableware, but also results in less food and water waste. A 2012 study published in the *Journal of Hunger & Environmental Nutrition* documented a 32% reduction in food waste and 27% reduction in dish use when universities make their trays unavailable¹⁸. A 2008 study by Aramark reported that an estimated 0.33 to 0.5 gallons (1.2 to 1.9 litres) of water is used per tray for washing.¹⁹

To implement trayless dining, the dining committee can simply refrain from purchasing any trays for the dining hall next semester (which also saves costs). They should also work with the contractor to ensure that all the tableware are optimised for use without trays.

If the new dining hall goes into operation with trays, removing them at a later time will become substantially harder. The study by Aramark recommends the removal of trays at the beginning of the academic year. If absolutely necessary, the college might purchase a few trays, to be given out by the staff only on special request.

¹⁸ Kim, K., and Morawski, S. (2012). Quantifying the Impact of Going Trayless in a University Dining Hall. *Journal of Hunger & Environmental Nutrition*, 7(4), pp. 482-486

¹⁹ Aramark. (2008). *The Business and Cultural Acceptance Case for Trayless Dining*.

2b) Self-Service

We propose that students be allowed to take food for themselves, instead of having staff serve food from behind a counter. Studies by University of California Berkeley²⁰, Western Michigan University²¹, and the US Department of Agriculture²² suggest that self-serving can help reduce food waste. In our own dining hall survey conducted among students, 55.8% of respondents felt that staff giving too much food contributed to their food waste, 86.2% felt that self-service might help them reduce their food waste, and 88.4% indicated interest in trying out self-serving. Additionally, self-service requires less manpower, only requiring staffers to check the food periodically to replace the dishes that have been finished.

Self-service would heighten the disparity between foods that are well-received and not as well, as students would opt to take much more of the former. Without servers, it might be difficult to ration food that is higher in demand, which would run out more quickly than others. The best way to avoid this is to ensure that all dishes are well-received, which should be the goal of the dining hall anyway and helps minimise food wastage. As such, self-service could also encourage an overall increase in the quality of food in the long run.

²⁰ Lam, Y. (2010). *Why Do UC Berkeley Students Waste Food at Dining Halls?* University of California Berkeley

²¹ Merrow, K., Penzien, P., and Dubats, T. (2012). *Exploring Food Waste Reduction in Campus Dining Halls*. Western Michigan University

²² Guthrie, J. F., Buzby, J. C. (2002). Several Strategies May Lower Plate Waste in School Feeding Programs. *Food Review*, 25(2), pp. 36-42.

2c) 9-Inch Plates

We propose that the dining hall use plates no bigger than 9-inches (23 centimetres) as its standard size, as recommended by the report by Western Michigan University²³ and *The 9-Inch 'Diet'*²⁴. Numerous studies show that reducing plate sizes encourages people to take less, thereby generating less food waste. A study on Chinese buffets shows that diners with large plates served 52% more, ate 45% more, and wasted 125% more food than those with smaller plates.²⁵ A study on Nordic Choice Hotels in Scandinavia found that reducing the plate sizes in its buffets reduced food waste by 19.5%.²⁶

Hungrier students are encouraged to go back for seconds instead of trying to stack everything on one plate (for this to work, a single tap must allow them to take food as many times as they want). If congestion is an issue, then perhaps we could offer larger 11-inch plates as well, but students should be heavily discouraged from using these plates unless they really need it. For instance, we could put up the following signs in front of the 9-inch and 11-inch plates respectively:

HUNGRY
I want a nice, filling meal!

RAVENOUS
I'll lick up every last bit on that plate!

²³ Merrow, K., Penzien, P., and Dubats, T. *Op. cit.*

²⁴ Bogusky, A., Porterhouse, C. (2008). *The 9-Inch 'Diet': Exposing the Big Conspiracy in America*. Brooklyn, NY: Powerhouse Books.

²⁵ Wansink, B., van Ittersum, K. (2013). Portion size me: plate-sized induced consumption norms and win-win solutions for reducing food intake and waste. *J Exp Psyc App*, 19(4), pp. 320-332.

²⁶ Kallbekken, S., and Sælen, H. (2013). 'Nudging' hotel guests to reduce food waste as a win-win environmental measure. *Economics Letters*, 119(3), pp. 325-327.

2d) Minimising Individually-Packaged Food

We propose that the dining vendor minimise, if not eliminate all, individually-packaged food from its menu. For definitional purposes, individually-packaged food is food that is presented to the consumer in some form of packaging, and requires both primary and secondary packaging. The old dining hall served a substantial amount of individually-packaged food, including packaged buns, juice packs, and fruit cups. Packaging contributes substantially to landfill waste in Singapore. Most of the packaging is plastic, which has a poor recycling rate of 11%.²⁷ Eliminating individually-packaged food will also make it easier to sort food waste for composting.

All of the healthy options that are pre-packaged, such as fruits and fruit juice, can easily be sourced without individual packaging, and all of the processed options, such as biscuits and cakes, can be sourced without individual packaging as well (but they should also be featured less often). The Dining Advisory Committee should assist the contractor to look for non-packaged alternatives whenever possible.

Although leftover quantities of pre-consumer non-packaged foods will be harder to store, we have been assured that pre-consumer waste will be reduced to an absolute minimum in the new dining hall.

²⁷ National Environment Agency,. (2015). *Waste Statistics and Overall Recycling*. Retrieved 7 March 2015, from <http://www.nea.gov.sg/energy-waste/waste-management/waste-statistics-and-overall-recycling>

2e) Minimising Unhealthy/Processed Food

We propose that the dining hall adopt a labelling system to differentiate between healthy/unprocessed and unhealthy/processed foods, and place strict quotas on the number of unhealthy/processed dishes that can be present at any meal. Processed food is also transported further and requires greater amounts of packaging than unprocessed food, accounting for about 19% of the total energy use in the US food system.²⁸

Our previous dining hall used nutritional labels to describe the healthiness of their foods, with green signifying healthy, yellow signifying moderately unhealthy, and red signifying unhealthy. The new vendor should come up with such a labelling scheme (also providing total fat, saturated fat, trans fat, cholesterol, sodium, and sugar in terms of RDA), and maintain strict quotas for foods that are either yellow or red each meal.

One problem with such quotas is that it will not work in tandem with self-service unless students themselves opt for healthy food. While it takes knowledge and skill to craft tasty yet healthy options, processed food is designed to be appealing with minimal effort. Great care will be needed to ensure that healthy options are varied, nutritious, filling, and delicious. The Dining Committee should assist the contractor in the planning of healthy options.

²⁸ Pimentel, D., Williamson, S., Alexander, C. E., Gonzalez-Pagan, O., Kontak, C., Mulkey, S. E. (2008). Reducing Energy Inputs in the US Food System. *Human Ecology*, Vol 36, Issue 4, pp. 459-471

2f) Reducing Animal-Based Products

We propose having better and more varied vegetarian and vegan options. All stalls should have meatless options that can act as nutritionally-balanced standalone meals. Meatless options should not simply be offered at a separate stall from the non-vegetarian options. Production of meat, milk, and eggs is an inefficient and resource intensive process. It requires plant food to first be grown to be used as animal feed, much of which is converted into waste products such as carbon dioxide, nitrogen oxide, and manure to rear animals. The United Nations Environment Programme (UNEP) reports that meat production contributes substantially to environmental impact in terms of land use, water use, and emissions of greenhouse gases, making meat-reduction one of the highest priorities in environmental protection.²⁹

We also propose setting quotas for the use of beef and lamb. The production of beef and lamb is far more intensive than that of chicken and pork, and should be featured less (perhaps not more than twice a week). In Europe it is estimated that 1kg of beef requires 13.5m³ of water and produces 22.6kg of CO₂-equivalent emissions, compared to 4.6m³ of water and 3.5kg of CO₂-equivalent emissions for pork, and 4.1m³ of water³⁰ and 1.6kg of CO₂-equivalent emissions³¹ for poultry.

As with healthy options, the problem with quotas is that they will not work in tandem with self-service unless students themselves opt to eat less meat. I'dECO will run educational campaigns emphasising the environmental impact of meat. At the same time, great care will be needed to ensure that vegetarian and vegan options are varied, nutritious (especially when it comes to protein), filling, and delicious. The Dining Committee should assist the contractor with planning meatless options.

²⁹ United Nations Environment Programme. (2010). Assessing the Environmental Impacts of Consumption and Production: Priority Products and Materials. Retrieved on 12 December 2014 from <http://www.unep.fr/scp/publications/details.asp?id=DTI/1262/PA>

³⁰ Zimmer, D. and Renault, D. (2003). Virtual Water in Food Production and Global Trade: Review of Methodological Issues and Preliminary Results. *World Water Council*.

³¹ Lesschen, J.P., Ven den Berg, M., Westhoek, H.J., Witzke, H.P. and Oenema, O. (2011). Greenhouse gas emission profiles of European livestock sectors. *Animal Feed Science & Technology*. Vol 166-167, pp. 16-28

2g) Recycling of Oil

We propose for oil used to deep-fry food to be recycled through collaboration with Alpha Biofuels. During the cooking process, oil may be used to deep-fry food, which cannot be re-used or given away. Used cooking oil is a valuable resource that can be refined and used in industrial activities, including the generation of biodiesel, even if it cannot be used for human consumption.

Alpha Biofuels, a homegrown company catered specially to commercial kitchens, allow users to easily recycle cooking oil. It provides containers and collection services, and the only resource required on the user's part is to diligently fill the container with oil after use. Alpha Biofuels also provides educational programs to allow students to learn about the process of converting waste oil to biodiesel. Alpha Biofuel containers are already used in canteens across NUS, so it would not be difficult for Yale-NUS to implement these as well.

Nevertheless, the dining hall should generally refrain from deep-frying food where possible, and this should only be a back-up strategy.

3. Advanced Recommendations

Advanced recommendations are more difficult to implement and require further research; we wish to work with SATS and the dining committee to figure out what further research needs to be done to ensure their eventual successful implementation.

3a) Requesting Blemished Food

We propose that SATS specially request for blemished food/food with damaged packaging at a discounted rate when supplying its inventory. This not only results in a lower contribution to Singapore's landfills or incineration plants, but also reduces Yale-NUS's costs in the long-run from not having to engage a food disposal service or purchase fertiliser for its plants.

Although reducing food waste should always take precedence before reusing it, there will inevitably be some amounts of food waste produced due to vegetable scraps, fruit peels, and bones. The ecoDigester is an on-site machine that accelerates the decomposition of food waste into liquid fertiliser, which may either be used on the plants around campus or discharged as a liquid waste, instead of being sent to an incineration plant. The ecoDigester is able to handle large capacities of food waste and can complete digestion within 24 hours. The ecoDigester is unable to decompose packaging, however, so there will need to be a separate bin for them.

3b) Converting Food Waste to Fertiliser

We propose that the school purchase an ecoDigester machine³² to accelerate the decomposition of leftover food waste into liquid fertiliser. This not only results in a lower contribution to Singapore's landfills or incineration plants, but also reduces Yale-NUS's costs in the long-run from not having to engage a food disposal service or purchase fertiliser for its plants.

Although reducing food waste should always take precedence before reusing it, there will inevitably be some amounts of food waste produced due to vegetable scraps, fruit peels, and bones. The ecoDigester is an on-site machine that accelerates the decomposition of food waste into liquid fertiliser, which may either be used on the plants around campus or discharged as a liquid waste, instead of being sent to an incineration plant. The ecoDigester is able to handle large capacities of food waste and can complete digestion within 24 hours. The ecoDigester is unable to decompose packaging, however, so there will need to be a separate bin for them.

Given the cost of the machine, we could apply for the NEA 3R fund³³ or the IRAS PIC³⁴ scheme to alleviate the cost of purchasing it. According to Eco-Wiz³⁵, the ecoDigester machine will also bring about cost savings in the long run due to money saved from not having to pay for food waste transportation and disposal services. Additionally, while Yale-NUS College should pay for the cost of this machine, the dining staff will have to be trained to use it.

³² For more information, visit <http://www.eco-wiz.com/ecoDigester.html>

³³ National Government Agency. (n.d). *3R Fund*. Retrieved 17 May 2015 from <http://www.nea.gov.sg/grants-awards/3r-fund>

³⁴ Inland Revenue Authority of Singapore. (n.d). *Productivity and Innovation Credit*. Retrieved 17 May 2015 from [https://www.iras.gov.sg/irashome/PIcredit.aspx%23About Productivity and Innovation Credit](https://www.iras.gov.sg/irashome/PIcredit.aspx%23About%20Productivity%20and%20Innovation%20Credit)

³⁵ Eco-Wiz Presentation slides.

3c) Order Cancellation System

We propose a system to notify the dining hall in advance when events with large amount of foods are planned. Yale-NUS is known for having many events where food is freely offered. Such events can result in high amounts of food wastage when the dining hall goes un-notified and prepares the same number of meals as per normal even if less students are eating there. Presently, there is little communication between the dining hall and the organisers of such events.

The dining committee should set up a form for students and faculty to fill should they intend to organise any events with large amounts of food, with the date, time, and estimation of the number of people they are feeding, which the dining hall can then take into account when deciding how much food to prepare. An estimated minimum notification time might be one week in advance, but this will depend on the input of the contractor.

However, Professor Michael Maniates has suggested that an opt-out form might not be effective until the school has achieved a more widespread culture of sustainability. In order to ensure that people do use the form, some kind of disincentive might be required – for instance, the DOS could penalise clubs that neglect to inform the dining hall by penalising the amount of money reimbursed for the food. This might be resisted by students. Ideally, a strongly culture of sustainability would make disincentives obsolete.

One issue is how one might go about quantifying what makes an event large enough to warrant notification, and what does not. This will depend on input from the contractor.

3d) Sourcing Locally/Organically

We propose that Yale-NUS College collaborate with local organic farms to establish farm-to-college programs (refer to Annex C for a list of organic and local farms). An example of a farm-to-college program is that between Ferrum College and Riverstone Organic Farm, which supplies the college with organic fruits and vegetables. Riverstone Organic Farm also teaches volunteers about the know-how of farming and the importance of sustainable agriculture.³⁶

Singapore imports 90% of its food, mostly from Malaysia, Brazil, and Australia, and also a wide range of other countries³⁷, resulting in a lot of energy spent on and carbon emissions generated from the transportation and storage of food. Most imported food also comes from large-scale industrial farms, linked to high use of chemical-based fertilisers and pesticides, as well as soil nutrient depletion and loss of arable land.³⁸

Sourcing locally would, first and foremost, reduce the college's ecological footprint for food consumption. Secondly, providing business to local farms would help support the local farming industry, which receives limited governmental support³⁹. Thirdly, collaboration provides opportunities for internships, talks, and workshops, which can provide an experiential component for the environmental studies and urban studies major programs in the college.

This does not mean that all food should be locally or organically sourced, given cost concerns. Should local sources fail, sources in Malaysia should be considered, followed by the next furthest country food (refer to Annex D for a list of the food miles and carbon costs of importing from different countries). Moreover, this applies far more to foods that air-flown compared to foods that are shipped (where the disparity in the carbon cost of transportation is much less pronounced), so fresh foods should be our primary area of focus.

³⁶ Adams, D. (2013, 27 March.), *Organic Farm, College Do What Comes Naturally*. The Roanoke Times. Retrieved 28 December 2014 from http://www.roanoke.com/news/local/floyd_county/organic-farm-college-do-what-comes-naturally/article_33cecae1-9e6c-55ef-85fc-a9fc1594a89b.html?mode=story

³⁷ Interview with the Agri-Food and Veterinary Authority, in Ghosh, A. (2013, April 29). Where does Singapore Source its food from? *The New Paper*.

³⁸ Mission 2014: Feeding the World. (n.d). *Organic Industrial Agriculture*. Retrieved 2 January 2015 from <http://12.000.scripts.mit.edu/mission2014/solutions/organic-industrial-agriculture>.

³⁹ As reported from the Class of 2018's *Far Food Nation* week 7 trip.

Unfortunately, the high cost of land (and lack of subsidies) makes sourcing for local, organic produce more expensive in Singapore than doing so in the US. While organic produce in the US might be on average 68% more expensive according to a survey by Colby College in Maine⁴⁰, sourcing locally and organically in Singapore is much more expensive, costing more than double the price for most goods (refer to Annex E for a comparison of prices).

The cost-feasibility of sourcing locally and organically will probably depend on several factors:

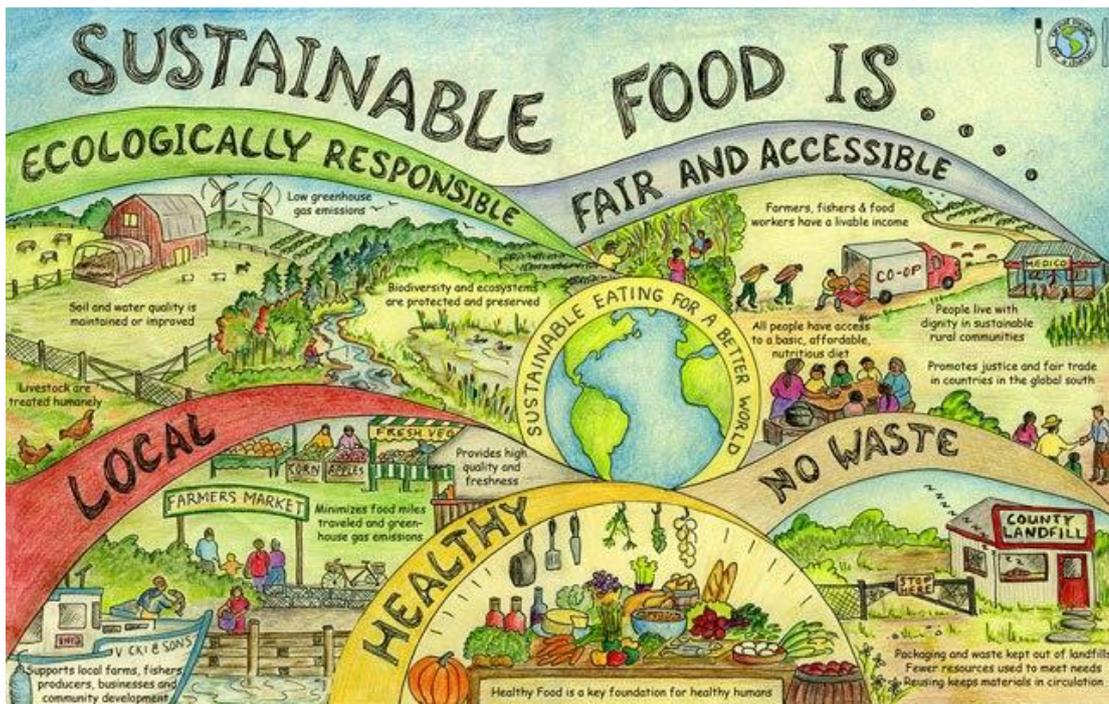
1. The ability to negotiate better deals with local farms in return for consistent business.
2. The ability to provide local farms the means to invest in better ways to cut costs.
3. The ability to justify the higher cost in terms of other qualitative benefits, such as work experience opportunities and tours.
4. The ability to balance out the higher cost by cutting costs in other areas, such as by reducing food wastage, running our own dining hall and outsourcing work to students etc.

Otherwise, the college may want to increase residential fees to compensate for higher costs. In the Dining Advisory Committee student experience survey, a number of students expressed interest in paying more for better food.

⁴⁰ Pillsbury, M. (2011). Price Differences. *The Maine Organic Farmer & Gardener*. Retrieved 18 May 2015 from <http://www.mofga.org/Publications/MaineOrganicFarmerGardener/Fall2011/PriceDifferences/tabid/1966/Default.aspx>

7. Conclusion

The dining hall report is meant to be a resource to help start the conversation on sustainable dining. We will no doubt learn many things along the way, and be able to refine our strategies to make them more successful. The important thing is to take a step towards making the realisation of sustainability as a priority for Yale-NUS, both academically and in terms of residential life.



Source: Ten Rivers Food Web: <http://www.tenriversfoodweb.org/>

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ANNEX A: DINING HALL SURVEY RESULTS

The dining hall survey was conducted from 24/11/2014 to 3/12/2014, a period of 10 days. The survey was posted on Google as a follow up to RC³ "responsible living - food waste segment". The survey was disseminated via Facebook, on the Yale-NUS College Students Facebook page, as well as via e-mails from Vice-Rectors. The survey garnered 95 responses. 28 survey responses were obtained prior to a post on Facebook.

Multiple-Choice Questions:

An overwhelming 70.5% of respondents reported that the RC³ "responsible living - food waste segment" made no differences to their dining habits. Only 6.3% stated that the competition made difference both during and after the event. The survey found that 40% of respondents reported wasting about a quarter of their food. 50.5% of respondents reported wasting a quarter or more of their food. The trend of heavy food wastage in Yale-NUS College was affirmed in this survey. The survey also questioned students on reasons for food wastage, assuming that most students wasted food because they took too much food. The survey also asked students for their opinions on possible initiatives in the dining hall.

Reasons for not finishing food:

Only 26.31% of students reported "Taking too much food" as a strong or very strong reason for not finishing food. In contrast, 46.3% reported that it was a weak or very weak reason. This mostly agreed with answers for the following questions, where students were asked for reasons why they took much food. Rather, unsatisfactory food quality was cited –89.5% of students felt it was a strong or very strong reason, with 57.9% citing it as a very strong reason. 55.8% of students felt that staff giving too much food was a strong or very strong reason. The survey findings indicate that food quality is the strongest determinant for whether or not students finish food, although staff giving too much food is also a significant reason. To make dining options more popular, caterers sometimes serve deep-fried and typically processed food. Efforts must be made to ensure food nutrition is not compromised for taste alone.

Reasons for taking too much food:

An average of 20.7% students answered that they did not feel they took too much food. While taking too much food was not an issue for most students, as most questions yielded mostly weak, very weak and neutral responses, those who felt taking too much food was a problem indicated that miscommunication with dining hall staff is an issue. 45.8% of students indicated it as a strong or very strong reason. There are several recommendations that might follow, which include improving communication through signalling, etc. or allowing students to serve themselves.

Self-serving

53.6% of students indicated that self-serve style would reduce their food waste, and another 32.6% indicated that maybe, most likely, self-serve style would reduce their food waste. This is contrary to most articles, which indicate that buffet style tends to lead to more wastage. Perhaps a trial can be conducted to test if self-serve style truly reduces food waste. 88.4% of students indicated willingness to try buffet-style serving in the dining hall.

Sampling food

Respondents were less confident that sampling food would reduce food waste, with 25.3% saying yes and 23.2% saying no. However, most students were to the idea of sampling food, with 69.5% answering yes to that question. That said, some students also expressed logistic and hygiene concerns with sampling food in the open answer sections.

Open-answer Response

Survey results on food quality

In the survey, 89.5% of students felt unsatisfactory food quality was a strong or very strong reason for not finishing their food. These results were also demonstrated in the section on additional comments, where most comments were related to food quality.

Vegetarian Options

Many students expressed dissatisfaction with vegetarian options. Some mentioned that vegetables are not well-cooked, and as a result are hard and unappetizing. Others mentioned that vegetarian options are not nutritious and expressed dissatisfaction with mock meat. Students also highlighted that there was little vegetarian options in the first place. Perhaps there can be a move towards vegetarian options with higher protein content, or a better stocked salad bar. Students also remarked on the lack of vegetables in the Malay Stall.

Animal-based products

There were fewer comments on animal-based products, except for one or two students who felt the cooking of beef could be improved. However, students were concerned about milk in the dining hall. Several students remarked that the school could purchase raw milk instead of UHT milk, for nutrition and taste reason. Other students commented that milk sometimes taste sour, and goes foul. This is a hygiene issue, and protocol could be put in place for students to report when milk spoils, and report that to the dining hall staff. A sampling could also be done before food is served.

Balancing taste with health

Currently, the dining hall decides what goes into the menu based on student feedback. Dishes which receive a high amount of student "tickets" gets reproduced more often than those that don't. By this method, processed and fried food tends to appear more often towards the end of the semester. While improving taste is important for any dining hall, it is also just as important for schools to serve fresh and wholesome food, and avoid using cheap, easy, processed and fried food. Nutrition signs could be more accurate, and sometimes, making the switch can be simple. Transiting from cereal to musli is an example, and something the dining hall can already do.

ANNEX B: LIST OF LOCAL FARMS

Here is a list of various farms in Singapore that Yale-NUS should consider sourcing its food from:

Plant Produce

<u>Quan Fa Organic Farm</u> Website: http://quanfaorganic.com.sg/ Phone: (65)-6793-7693 Email: info@quanfa.com.sg	<u>Green Circle Eco-Farm (Organic)</u> Website: http://www.greencircle.com.sg/ Phone: (65)-6861-9286 Email: soo@greencircle.com.sg
<u>Fireflies Farm (Organic)</u> Website: http://firefliesweb.wix.com/fireflieshealthfarm Phone: (65)-6793-7875 Email: info@fireflies.sg	<u>Kok Fah Technology Farm (</u> <i>(However, most of the farm operates in Malaysia)</i> Website: http://www.kokfahfarm.com.sg/vegetable-farm/ Phone: (65)-6765-6629 Email: enquiry@kokfahfarm.com.sg

Seafood

<u>OnHand Agrarian</u> Website: http://onhandgroup.com/agrarian.html Phone: (65)-9862-7310 (Shannon Lim, corporate communication and sales) Email: Shannon@OnHandgroup.com	<u>Qian Hu Fish Farm</u> Website: http://www.qianhu.com/ Phone: (65)-6766-7087 Email: fishexport@qianhu.com
<u>KhaiSeng Trading & Fish Farm</u> Website: http://www.myonlinetour.com/poi/khaiseng/index.htm Phone: (65)-6793-7789	

Eggs

<u>Egg Story</u> Website: http://www.eggstory.com.sg/ Phone: (65)-6792-9745 Email: enquiries@eggstory.com.sg	<u>Seng Choon Farm</u> Website: http://www.sengchoonfarm.com/ Phone: (65)-6762-2858 Email: http://www.sengchoonfarm.com/contact/
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Poultry <u>Gesing Group Sdn Bhd (GGSB) Farm</u> Website: http://www.oeo.com.sg/oeo_gesing.asp Phone: (65)-6283-3800 Email: alextoh@oeo.com.sg	Dairy <u>Hay Dairies</u> A farm in Singapore that sells goat milk. Website: http://www.haydairies.com.sg/ Phone: (65)-6792-0931 Email: order@haydairies.com.sg
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ANNEX C: FOOD KILOMETRES AND CARBON IMPACT CHART

Here is a list of most common countries that Singapore imports food from, and an estimation of the average food kilometres and carbon emissions generated of importing from those countries. Carbon emissions are calculated in terms of CO₂-equivalent gases per kg of food.⁴¹

Generally, fresh produce must be flown by air. Longer-lasting goods may be shipped by sea. If goods are transported from Malaysia, fresh or not, it may be done by truck.

<u>Country</u>	<u>Food Km (km)⁴²</u>	<u>Air Transport</u>	<u>Sea Transport</u>	<u>Land Transport</u>
Malaysia	317	0.4	0.05	0.1
Indonesia	891	1.0	0.1	-
Vietnam	2205	2.4	0.3	-
India	4149	4.6	0.5	-
China	4476	4.9	0.6	-
Japan	5322	5.9	0.7	-
Australia	6216	6.8	0.8	-
New Zealand	8523	9.4	1.1	-
South Africa	8634	9.5	1.1	-
Denmark	9966	11.0	1.3	-
Norway	10054	11.1	1.3	-
The Netherlands	10496	11.5	1.4	-
Ireland	11204	12.3	1.5	-
United States	15541	17.1	2.0	-
Uruguay	15742	17.3	2.0	-
Argentina	15877	17.5	2.1	-
Brazil	16522	18.2	2.1	-

⁴¹ Data calculated using the Food Miles Calculator by the Falls Brook Centre at <http://www.fallsbrookcentre.ca/cgi-bin/calculate.pl>, retrieved 14 December 2014.

⁴² Data calculated using the Food Miles Calculator by FoodMiles.com at <http://www.foodmiles.com/>, retrieved 14 December 2014.

ANNEX D: PRICE COMPARISON OF ORGANIC PRODUCE FOR SELECT VEGETABLES

Information was obtained from the Fairprice online catalogue⁴³ and the websites of Green Circle Eco-farm⁴⁴ and Quanfa Organic Farm⁴⁵. All prices are listed per 100g except that of eggs.

<p><u>Apple</u> Conventional, Saudi Arabia: \$0.45 Organic, Singapore (Green Circle): \$1 (220%)</p>
<p><u>Bittergourd</u> Conventional, Malaysia: \$0.12 Organic, Singapore (Green Circle): \$0.90 (750%) Organic, Singapore (Quanfa): \$0.90 (750%)</p>
<p><u>Brinjal</u> Conventional, Malaysia: \$0.50 Organic, Singapore (Green Circle): \$0.85 (170%) Organic, Singapore (Quanfa): \$1 (200%)</p>
<p><u>Chye Sim</u> Conventional, China: \$0.48 Organic, Singapore (Green Circle): \$1 (210%) Organic, Singapore (Quanfa): \$1 (210%)</p>
<p><u>Eggs</u> Conventional, Malaysia: \$0.16 per egg Conventional, Singapore: \$0.25 per egg (160%) Organic, Singapore (Quanfa): \$0.28 per egg (180%)</p>
<p><u>Kailan</u> Conventional, Singapore: \$0.39 Organic, Singapore (Green Circle): \$1.50 (380%) Organic, Singapore (Quanfa): \$1 (260%)</p>
<p><u>Long Bean</u> Conventional, Malaysia: \$0.55 Organic, Singapore (Green Circle): \$1.20 (220%) Organic, Singapore (Quanfa): \$1 (180%)</p>
<p><u>Potato</u> Conventional, Indonesia: \$0.25 Organic, Singapore (Green Circle): \$0.75 (300%)</p>
<p><u>Shiitake Mushroom</u> Conventional, China: \$0.80 Organic, Singapore (Quanfa): \$5 (630%)</p>
<p><u>Tomato</u> Conventional, Malaysia: \$0.45 Organic, Singapore (Green Circle): \$1 (220%)</p>
<p><u>Xiao Bai Chye</u> Conventional, Singapore: \$0.34 Organic, Singapore (Green Circle): \$1 (290%) Organic, Singapore (Quanfa): \$1 (290%)</p>

⁴³ <http://fairprice.com.sg/webapp/wcs/stores/servlet/en/fairprice> accessed 18 May 2015.

⁴⁴ <http://www.greencircle.com.sg/> accessed 18 May 2015.

⁴⁵ <http://quanfaorganic.com.sg/> accessed 18 May 2015.