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A Sustainability Analysis of Team Orange County's Home Life Events During the U.S. Department of Energy: 2015 Solar Decathlon

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A Sustainability Analysis of Team Orange County's Home Life Events During the U.S. Department of Energy: 2015 Solar Decathlon

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Introduction

This project will look at the U.S. Department of Energy's 2015 Solar Decathlon and examine Chapman University's involvement in Team Orange County. This project will further examine the Home Life sub-competition by studying the sustainability of the components of the two Home Life dinners, the movie night party, and the energy budget associated with each of the three events. Reviewing team documents and collecting data from affiliated team members will give us an overview of the efforts taken to achieve sustainability for the dinners and movie night. We found various practices were incorporated in the menu-concepts for the three nights, during which these events were hosted, which integrated sustainable practices to embody the goal of the U.S. DOE's Solar Decathlon. Finally, the overall sustainability of these three hosted events will be correlated to the net-zero nature of the home, Casa del Sol, and the impacts of these dinners in regards to the average meal and movie night to understand the sustainability of this sub-competition.



Figure 1: Rendering of Team Orange County's "Casa del Sol," submission to the U.S. partment of Energy's 2015 Solar Decathlor

Research Questions

In order to analyze the sustainability and impact of Team Orange County's efforts, we asked:

- How does a plant-based diet compare to a standard omnivorous diet, in regards to environmental impact?
- How are food, entertainment, & home life conceptualized as sustainable activities? Just how sustainable are these activities?
- How are the choices made in the meals selected & served reflective of sustainable living? What does the research tell us about this?
- What was the water footprint of food served during the competition, compared to a typical American meal of equal caliber?

Methods

In order to fully understand the sustainability of these three hosted events, a water footprint analysis was done for the ingredients of the meals and the energy demand of the food's production (based on trophic level source) was all taken into account. Information on the menus was sourced from Team Orange County's Home Life work group, which were submitted in the August 2015 deliverable for the U.S. DOE's Solar Decathlon requirements. This analysis will focus on the specific calculations for each individual ingredient, in terms of associated water budget to understand the immediate impact such menus would have on California's extreme state of drought.

Furthermore, and overall examination of plant-based diets was completed for a better understanding of the various facets in food consumption and the often hidden environmental impact of uninformed food choice

Theoretical Framework

•Primarily plant- and seafood-based diets (responsibly

•Energy efficient food preparation (in relation to appliance

Principles of Sustainability:

efficiency and source of energy)

Biological Cycle

Food grain

Oil crops

Fruit

Fish

Eaas

Nute

Total

Table 3: Per capita food

consumption, energy, and protein of foods of a

lacto-ovo-vegetarian diet

meat-based diet vs. a

in the U.S.

930#JOmi1/0FMzyofH8/97

Animal fats

Feed grains³

Sugar and sweeteners

Data from FAOSTAT (*).

Pulses (legumes)

Figure 2: Cradle-to-cradle cycle framework; Source: www.c2cplatform.tw

kg kcal g 114 849 24.9

71 3.0

109 122 1.4 124 452 41.1

385 55 22.5

23 0.6

994.9 3533 111.5

20.3 28 4.7

74 686 0.2

816.0 -

³Feed grains are cereal grains fed to livestoc

43 40 147 2.0

256

14.5 4.2

24 548 127 0.2 kcal g 1132 33.2

473 30.0

686 0.2

3533 89.3

570 0.2

8.8

4.0

70 155 4.5

kg 152

7.5 286

112 122 1.9

307.1

19.2 73 5.6

25

74

4.0

1001.5

450.0

grown and harvested)



one of the dinners

Decathlon 2015

Figure 3: Spread of dishes from Source: Team Orange County Solar

Figure 4: Vertical garden utilizing drip-irrigation from grey water and rain water catchment systems in the home. Everything being grown is edible. Source: http://teamoc2015.com

Results:

"Making a sustainable future feel like home."

Casa del Sol	Water Footprint for	"Control"	Water Footprint
Dinner Course	Ingredients (per	American Dinner	for Ingredients
	serving)	(1 plate setting)	(per serving)
Apple Pecan Salad with	253.50 L, or 66.9	Grilled asparagus	162.6 gallons
sourdough crostini	gallons	(8oz)	
(2 cups)	-		
DIY Shrimp Street	684.24 L, or 180	Serving of beef	850.2 gallons
Tacos, with avocado	gallons	(8oz)	-
puree and sautéed	-		
vegetables			
(2 tacos with all			
ingredients)			
Buttermilk Pana Cotta	1,359.17 L, or 359.1	Roasted potatoes	17.9 gallons
(1 5oz cup)	gallons	(60Z)	
Watermelon Agua	114.09 L, or 30.14	Apple juice	33.8 gallons
Fresca with mint (8oz)	gallons	(80z)	-
TOTAL:	636.14 gallons	TOTAL	1.064.5 gallons

Table 1: Water budget analysis for a dinner course served during the Home Life tition, in comparison to an American dinner of equal eco

Casa del Sol	Water Footprint for	"Control" American	Water Footprint for
Movie Snacks	Ingredients (per	Snacks	Ingredients (per
	serving)		serving)
Rich Mexican Hot	480 L, or 126.8	Soda (16oz)	32.2 gallons
Chocolate (12oz)	gallons		-
Chocolate Coconut	191.15 L, or 50.5	Chocolate-Almond	264 gallons
Date Mounds	gallons	Candy Bar	-
TOTAL:	177.3 gallons	TOTAL:	296.2 gallons

Table 2: Water budget analysis for movie snacks served during the Home Life competition, in comparison to a typical American movie snack

Conclusions

Unsurprisingly, our plant-based, three-course meal had a much smaller water footprint associated with it than the one plate setting meant to represent a typical dinner in the United States of equal caliber (specifically in relation to socio-economic status). The snacks chosen for the movie were also much healthier, less processed, and more wholesome than the snacks chosen to represent the "control," or standard, movie snack by an equally significant water budget. It should also be noted that the foods used in the mostly plant-based menu for the Solar Decathlon Home Life competition were also more inherently efficient due to trophic-level dynamics and the efficiency rate of transfer from one trophic level to the next. This analysis can conclude the sustainability of the meal prepared for the 2015 Solar Decathlon (as well as the movie snacks) was admirably high due to the high-efficiency of appliances, associated water footprint, and solar-powered aspect of our kitchen versus the typical American home.

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