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ORANGE-JUICE AND GRAPEFRUIT-JUICE CONTRIBUTIONS TO NUTRIENT INTAKES BY AMERICANS

BY

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Orange-Juice and Grapefruit-Juice Contributions to Nutrient Intakes by Americans¹

This study used data from the National Health Nutrition Examination Survey 2003-04 (NHANES 2003-04). This nationwide survey was conducted by the Center for Disease Control and Prevention. A total of 10,122 people were interviewed in NHANES 2003-04. The respondents were asked to complete an examination component in which dietary recalls were collected and physical examinations were performed.

The dietary interviews were conducted as a partnership between the U.S. Department of Agriculture and the U.S. Department of Health and Human Services. The dietary intake data (What We Eat in America) were used to estimate the types and amounts of foods and beverages consumed during the 24-hour period (midnight to midnight) prior to the interview and to estimate intakes of energy, nutrients, and other food components from those foods and beverages. Most participants had two days of complete and reliable intakes. The first-day dietary information was collected in the mobile examination center and the second-day dietary information was collected by telephone three to 10 days later. Proxy interviews were conducted for survey participants younger than six years of age. Assisted interviews were conducted with survey participants six to 11 years of age. Dietary interviews were conducted in both English and Spanish. Translators were used to conduct interviews in other languages. The two days of data permitted the estimation of usual nutrient intakes in order to assess diets in the United States.

Of the 10,122 participants, 7,275 had dietary information for both days and were four years of age and older. The dietary intake records of these 7,275 participants were reviewed and beverages were categorized into one of the 14 groups (Table 1).

Beverage Contributions to Calories and Nutrients

Table 2 shows the contribution of beverages to the average American's daily nutrient intakes in 2003-04. In general, beverages are major sources of sugar, vitamin C, calcium, carbohydrates, potassium, vitamin A, magnesium, phosphorus, and calories. In addition, beverages are sources of vitamins and minerals, such as zinc, iron, folate, vitamin E, sodium, α -carotene, and β -carotene.

Beverages accounted for 56.7% of total sugar, 54.3% of vitamin C, 40.5% of calcium, 30.4% of carbohydrates, and 24.9% of total vitamin A in the average American diet. The average American consumed 21.7% of all calories in the form of beverages. Beverages accounted for about one-fourth of total potassium (29.4%), phosphorus (23.2%), and magnesium (23.6%) intakes.

¹ Prepared by Jonq-Ying Lee, Senior Research Economist, Florida Department of Citrus, Economic and Market Research Department, P.O. Box 110249, Gainesville, FL 32611-0249. March 27, 2007. Staff Report #2007-1.

Americans consumed 8.5% of dietary iron, 7.8% of vitamin E (alpha-tocopherol), 8.2% of folate, and 12.0% of zinc from beverages. The detailed contributions of each of the 14 beverages are shown in Table A1 in the Appendix.

Plain milk was the most popular beverage in 2003-04, 64.5% of the survey participants had plain milk during the two-day recalls. Regular soft drinks (59.1%) ranked second, followed by milk-based beverages (44.2%), fruit drinks (42.6%), coffee (37.3%), orange juice (OJ) (30.1%), and grapefruit juice (GJ) (0.8%) ranked last. Regular soft drinks had the highest per capita consumption rate, 9.4 ounces per day or 26.7 gallons per year; followed by plain milk (16.6 gallons per year), coffee (15.9 gallons per year), and fruit drinks (13.7 gallons per year). Per capita consumption of OJ was 5.9 gallons per year and ranked number seven. This estimate is a little higher than the 5 gallons per year of the per capita consumption estimate from the disappearance data. GJ's per capita consumption rate of 0.2 gallon per year was ranked last. This 0.2 gallon per person is below our estimated per capita consumption rate of 0.33 gallons. One of reasons for the difference could be that some GJ was used in the production of grapefruit-juice cocktails and used in drink base (Table 3).

Note that the average consumption of OJ and GJ are less than one 8-ounce cup per day. This is because not all OJ/GJ consumers drank OJ/GJ on both days, only 31.8% (697 participants) of the OJ consumers had OJ for both days and 15.3% (9) of the GJ consumers had GJ on both days. The actual consumption rates for OJ consumers were 10.27 ounces and 10.07 ounces for day-one and day-two recalls, respectively; and the actual consumption rates for GJ consumers were 13.34 ounces and 8.77 ounces for day-one and day-two recalls, respectively.

Orange-Juice Contributions to Nutrient Intake

Table 4 shows the nutrients in one 8-ounce cup of reconstituted frozen concentrated orange juice and the relative importance of each nutrient in terms of Dietary Reference Intakes (DRI).² DRIs represent the new approach adopted in the late 1990s by the Food and Nutrition Board to providing quantitative estimates of nutrient intakes for use in a variety of settings, replacing and expanding on the past 50 years of periodic updates and revisions of the Recommended Dietary Allowances (RDAs). The DRI activity is a comprehensive effort undertaken to include current concepts about the role of nutrients and food components in long-term health, going beyond deficiency diseases.

The DRIs consist of four reference intakes: 1) the RDA--which is to be used as a goal for the individual; 2) the Tolerable Upper Intake Level (UL)--which is given to

² The nutrient contents for other OJ products are listed in Table A2 in the Appendix. There is controversy surrounding vitamins A and E in the USDA's nutrient table. Scientists in Lake Alfred indicated there should not be any vitamins A or E present in OJ; however, there are reports of the presence of trace of these two vitamins in the USDA nutrient tables, and the NHANES used these tables to derive the nutrient intakes from OJ.

assist in advising individuals what levels of intake may result in adverse effects if habitually exceeded; 3) the Estimated Average Requirement (EAR)--the intake level at which the data indicate that the needs for 50% of those consuming it will not be met; and 4) the Adequate Intake (AI)--a level judged by the experts developing the reference intakes to meet the needs of all individuals in a group, but which is based on much less data and substantially more judgment than that used in establishing an EAR and subsequently the RDA. When an RDA cannot be set, an AI is given. Both are to be used as goals for an individual.

As shown in Table 4, an 8-ounce cup of OJ provides about 100% of the DRI for vitamin C, 27.5% for folate, 20.6% for carbohydrates, 12.2% for copper, and between 6% to 10% for magnesium, potassium, manganese, and vitamin B-6.

The second column of Table 5 shows the contributions of OJ to the average American nutrition intakes. The consumption of OJ in America's diet accounted for 23.7% of the vitamin C intake; 4.6% of potassium; 4.4% of calcium; 2.8% of magnesium; between 1% and 2% of vitamin E, iron, and calories; less than 1% of the dietary fiber, protein, vitamin A, zinc, fats, and sodium; and no cholesterol intake. It seems that OJ's contributions to nutrition intakes by Americans are very small, except for vitamin C. However, when OJ's contributions are compared with other beverages, they are relatively significant.

Among the 14 beverages examined, OJ ranked at the top in contributions of vitamin E, vitamin C, and folate to America's nutrition intakes; second in potassium, iron, dietary fiber, vitamin B-6, and α -carotene; third in calcium, protein, and β -carotene; fourth in vitamin A and magnesium; fifth in phosphorous, zinc, carbohydrates, sugar, total fats, ranked sixth in saturated fats and calories; and ranked at the bottom in sodium (12th), and contains no cholesterol. Note that carbohydrates, sugar, fats, sodium, and cholesterol are some of the nutrients that people want to limit in their diet, and OJ ranked low in providing these nutrients among the 14 beverages studied.

The NHANES data also provide us with an opportunity to examine the OJ consumption rate by gender and age groups. As shown in Table 6, the heavy OJ drinkers are males and females 14-to-18 years of age and 19-to-49-years of age.

OJ has been considered to have excessive carbohydrates by some people and indeed, an 8-ounce cup of OJ provides 20.6% of the DRI of carbohydrates. Do OJ consumers weigh more than non-OJ consumers? As shown in Table 7, the average BMIs³ for OJ consumers and non-OJ consumers are the same; therefore, it seems the consumption of OJ did not make consumers heavier.

³ Body mass index (BMI) is a measure of body fat based on height and weight that applies to both adult men and women. BMI Categories: underweight = <18.5, normal weight = 18.5-24.9, overweight = 25.0-29.9, obesity = BMI of 30 or greater (source: http://www.cdc.gov/nccdphp/dnpa/bmi/adult_BMI/about_adult_BMI.htm).

Grapefruit-Juice Contributions to Nutrient Intake

Table 8 shows the nutrients in one 8-ounce cup of reconstituted frozen concentrated orange juice and the relative importance of each nutrient in terms of DRI. As shown in Table 8, an 8-ounce cup of GJ provides 92.4% of the DRI for vitamin C, 2.5% for folate, 18.5% for carbohydrates, and between 6% and 12% for copper, magnesium, potassium, manganese, and vitamin B-6. The detailed nutrient tables for different types of GJ are presented in Table A3 in the Appendix. Because only 0.8% of the participants consumed GJ, the contributions of GJ to America's nutrient intakes were very small and the sample size for GJ consumers was small (59 participants) and probably not representative; therefore, no further discussion will be provided.

Concluding Remarks

The NHANES 2003-04 data show that OJ and GJ users drank less than an 8-ounce serving per day in the two-day recalls and about 30% of the Americans drank OJ in the two-day recalls – ranked sixth. The NHANES 2003-04 data also show that less than 1% of the Americans drank GJ in the two-day recalls – ranked at the bottom.

Although OJ ranked sixth in the participant penetration rate and seventh in per capita consumption among the 14 beverages studied, OJ ranked number one in providing vitamins C and E, and folate; number two in providing potassium, iron, dietary fibers, vitamin B-6, and α -carotene; and ranked last in providing sodium and cholesterol. OJ provided only 2.4% of the carbohydrates and 4.4% of the sugar in the average American diet.

OJ has a high level of carbohydrates, but it also has many different kinds of vitamins and minerals. A recent story about the South Beach diet indicated that the dieters should eat some “good” carbohydrates, i.e., nutrient-rich carbohydrates. With the various nutrients found in OJ, OJ should be one of the good-carbohydrate sources for the South Beach dieters.

Table 1. Beverage categories

Beverage Group	Types of Beverages in the Group
Orange Juice	Orange and tangerine juices
Regular Soft Drinks	Carbonated soft drinks
Fruit Drinks	Fruit flavored drinks, nectars
Presweetened Tea	Tea with caloric sweeteners
Grapefruit Juice	Grapefruit juice
Diet Drinks	Soft drinks with non-caloric sweeteners, tea presweetened with non-caloric sweeteners
Fruit/Vegetable Juices	100% fruit juices and vegetable juices
Plain Milk	Whole, reduced-fat, and skim milk, evaporated milk, butter milk, milk dry (reconstituted)
Flavored Milk and Milked Based Beverages	Milk beverages, ice creams, frozen yogurts, milk shakes, cocoa mix, chocolate mix, condensed milk
Coffee	Brewed coffee, coffee prepared from dry mix r presweetened, cappuccino,
Tea	Tea made from tea leaves or powder
Meal Replacement Beverage	Infant formula, milk- or soy-based meal replacement beverages, breakfast drinks
Alcoholic Beverages	Beer, wine, cocktails, and alcoholic beverages
Other	Gelatin drinks, rice and corn beverages, cereal beverages, propel fitness water, water as in ingredient

Table 2. Contribution of beverages to nutrient intakes, 2003-04

Variable	All Foods		Beverages		
	Mean	Std Dev	Mean	Std Dev	% of Total
Sugar (gm)	129.18	66.89	73.19	53.13	56.7%
Vit C (mg)	96.15	84.22	52.23	72.76	54.3%
Calcium (mg)	891.54	500.33	361.29	354.46	40.5%
Carbohydrate (gm)	268.73	110.87	81.67	57.39	30.4%
Potassium (mg)	2510.43	1059.57	738.99	546.80	29.4%
Vit A (mcg)	577.45	494.70	143.78	197.81	24.9%
Magnesium (mg)	254.19	111.94	60.05	46.30	23.6%
Phosphorus (mg)	1270.75	541.77	295.24	268.27	23.2%
Calories (KCAL)	2099.42	824.02	455.09	309.77	21.7%
Sat Fats (gm)	26.13	12.99	4.23	4.87	16.2%
Vita B-6	1.83	0.96	0.24	0.32	13.3%
Protein (gm)	77.77	33.68	9.51	9.36	12.2%
Zinc (mg)	11.69	6.42	1.40	1.35	12.0%
Total Fats (gm)	78.19	36.30	7.23	8.11	9.3%
Cholesterol (mg)	273.07	179.14	24.73	28.74	9.1%
Iron (mg)	15.65	7.76	1.32	1.44	8.5%
Folate (DFE) (mcg)	542.47	317.14	44.62	46.20	8.2%
Vit E (ATOC) (mg)	6.41	4.13	0.50	1.00	7.8%
α carotene	311.34	723.56	20.25	410.32	6.5%
β carotene	1635.00	2433.31	93.02	920.98	5.7%
Sodium (mg)	3253.78	1429.43	179.18	159.78	5.5%
Dietary Fiber (gm)	14.69	7.64	0.74	1.06	5.0%

Table 3. Sample penetration and consumption rate, 2003-04 (two-day intakes)

	Penetration	Consumption		
	% Sample	Users Only	Per Capita	Per Capita
		Ounces/day		Gallons/Year
Plain Milk	64.5%	9.1	5.8	16.6
Regular Soft Drinks	59.1%	15.8	9.4	26.7
Milk-based Beverages	44.2%	4.0	1.8	5.0
Fruit Drinks	42.6%	11.3	4.8	13.7
Coffee	37.3%	15.0	5.6	15.9
OJ	30.1%	6.9	2.1	5.9
Fruit/Vegetable juices	22.2%	5.9	1.3	3.7
Alcoholic Beverages	16.3%	17.0	2.8	7.9
Diet Drinks	14.6%	15.4	2.2	6.4
Tea	14.5%	12.6	1.8	5.2
Presweetened Tea	14.3%	12.0	1.8	5.0
Meal Replacement Beverage	7.9%	6.1	0.5	1.4
Other	1.2%	7.1	0.1	0.2
GJ	0.8%	6.6	0.1	0.2

Table 4. OJ nutrients and dietary reference intakes (DRI)

	Unit	Nutrient ^a	DRI ^d	OJ % of DRI
Macronutrients				
Water	g	220.12	1700-3700*	5.9%
Energy	kcal	110	2215-2769 ^b	4.0%
Protein	g	1.99	19-56	3.6%
Total lipid (fat)	g	0.15	25-35 ^c	0.4%
Carbohydrate, by difference	g	26.84	130	20.6%
Fiber, total dietary	g	0.5	20-38*	1.3%
Sugars, total	g	20.92	<25% total energy	
Minerals				
Calcium, Ca	mg	22	800-1300*	1.7%
Iron, Fe	mg	0.25	8-18	1.4%
Magnesium, Mg	mg	25	130-420	6.0%
Phosphorus, P	mg	40	500-1250	3.2%
Potassium, K	mg	473	3800-4700*	10.1%
Sodium, Na	mg	2	1200-1500*	0.1%
Zinc, Zn	mg	0.12	5-11	1.1%
Copper, Cu	mg	0.11	0.44-0.90	12.2%
Manganese, Mn	mg	0.035	1.5-2.3	8.1%
Selenium, Se	mcg	0.2	30-55	0.4%
Vitamins				
Vitamin C, total ascorbic acid	mg	96.6	45-90	107.3%
Vitamin A, RAE	mcg_RAE	12	400-900	1.3%
Folate, DFE	mcg_DFE	110	200-400	27.5%
Vitamin E (alpha-tocopherol)	mg	0.5	7-15	3.3%
Vitamin B-6	mg	0.11	0.6-1.7	6.5%

^aOrange juice, frozen concentrate, unsweetened, diluted with 3 volume water. Source: <http://www.nal.usda.gov/fnic/foodcomp/search/> accessed January 30, 2007.

^bEnergy: estimated energy requirement for active persons with height 1.50m-1.80m.

^cFat: acceptable macronutrient for adults.

^dRDA in bold type and AI in ordinary type followed by an asterisk (*). Source: <http://www.iom.edu/Object.File/Master/21/372/0.pdf>, accessed 02-01-2007.

Table 5. OJ's ranking among 14 beverages, 2003-04

Nutrient	% Intake	Rank	Remark
Vitamin E (ATOC) ^a	1.98%	1	
Vitamin C	23.72%	1	
Folate (DFE)	2.61%	1	
Potassium	4.56%	2	Plain milk (10.7%)
Iron	1.59%	2	Regular soft drinks (1.8%)
Dietary Fiber	0.89%	2	Milk-base bev (2.7%)
vb6	2.85%	2	Milk-base bev (2.7%)
acar	0.98%	2	Fruit/veg juices (4.93%)
Calcium	4.41%	3	Plain milk (23.8%), milk-based bev (7.0%)
Protein	0.50%	3	Plain milk (7.7%), milk-based bev (2.3%)
bcar	1.09%	3	Fruit/veg juices (2.18%), fruit drinks (1.24%)
Vitamin A	0.95%	4	Plain milk (14.4%), milk-based bev (6.5%), meal replacement bev (1.6%)
Magnesium	2.76%	4	Plain milk (7.6%), milk-based bev (3.3%), coffee (2.8%)
Phosphorus	0.73%	5	Plain milk (13.4%), milk-based bev (4.2%), soft drinks (1.4%), alcoholic beverages (0.88%)
Zinc	0.37%	5	Plain milk (6.5%), milk-based bev (2.5%), meal replacement bev (0.7%), soft drinks (0.7%)
Carbohydrate	2.40%	5	Regular soft drinks (10.7%), fruit drinks (5.6%), milk-based bev (3.5%), plain milk (1.2%)
Sugar	4.35%	5	Regular soft drink (20.8%), fruit drinks (10.7%), plain milk (7.3%), milk-based bev (6.2%)
Total Fats	0.11%	5	Plain milk (4.9%), milk-based bev (3.7%), meal replacement bev (0.2%), coffee (0.2%)
Sat Fats	0.04%	6	Plain milk (4.9%), milk-based bev (3.7%), meal replacement bev (0.2%), coffee (0.2%), fruit drinks (0.04%)
Calories	1.30%	6	Regular soft drink (5.3%), plain milk (4.4%), milk-based bev (3.3%), fruit drinks (2.9%), alcoholic beverages (2.2%)
Sodium	0.04%	12	Fruit/veg juices (0.04%), GJ (0.00%)
Cholesterol	0.00%		Has no cholesterol

^aScientists in Lake Alfred indicated that there should not be any vitamins A and E in OJ; however, USDA nutrient tables show that there are traces of these two vitamins – see Table A2 in the Appendix.

Table 6. OJ consumption by gender and age group

Gender and Age Group	Consumption (Grams)*
Male & Female 4-8 years old	170.82
Male 9-13 years old	192.21
Male 14-18 years old	287.52
Male 19-49 years old	268.36
Male 50 years and older	179.56
Female 9-13 years old	190.00
Female 14-18 years old	249.01
Female 19-49 years old	231.95
Female 50 years and older	168.20
Male and Female 4 years and older	213.77

* 249 grams equals one cup.

Table 7. Average BMI of OJ consumers and non-OJ consumers by age group

Age Group	NON-OJ Consumers	OJ Consumers
Male & Female 4-8 years old*	17.31	17.41
Male 9-13 years old*	20.93	20.96
Male 14-18 years old*	23.83	24.02
Male 19-49 years old	27.53	27.46
Male 50 years and older	28.13	27.79
Female 9-13 years old*	21.79	21.64
Female 14-18 years old*	24.38	24.07
Female 19-49 years old	28.72	28.41
Female 50 years and older	28.52	28.76
Male and Female 4 years and older	25.68	25.16

*Percentiles are the most commonly used indicator to assess the size and growth patterns of individual children in the United States. Underweight: less than the 5th percentile; healthy weight: 5th percentile to less than the 85th percentile; at risk of overweight: 85th to less than the 95th percentile; overweight, Equal to or greater than the 95th percentile.

Table 8. GJ nutrients and dietary reference intakes (DRI)

	Unit	Nutrient ^a	DRI ^d	GJ % DRI
Macronutrients				
Water	g	220.57	1700-3700*	6.0%
Energy ^b	kcal	101	2215-2769 ^b	3.6%
Protein	g	1.36	19-56	2.4%
Total lipid (fat) ^c	g	0.32	25-35 ^c	0.9%
Carbohydrate, by difference	g	24.03	130	18.5%
Fiber, total dietary	g	0.2	20-38*	0.5%
Sugars, total	g	23.79	<25% total energy	
Minerals				
Calcium, Ca	mg	20	800-1300*	1.5%
Iron, Fe	mg	0.35	8-18	1.9%
Magnesium, Mg	mg	27	130-420	6.4%
Phosphorus, P	mg	35	500-1250	2.8%
Potassium, K	mg	336	3800-4700*	7.1%
Sodium, Na	mg	2	1200-1500*	0.1%
Zinc, Zn	mg	0.12	5-11	1.1%
Copper, Cu	mg	0.082	0.44-0.90	9.1%
Manganese, Mn	mg	0.049	1.5-2.3	11.3%
Selenium, Se	mcg	0.2	30-55	0.4%
Vitamins				
Vitamin C, total ascorbic acid	mg	83.2	45-90	92.4%
Vitamin A, RAE	mcg_RAE	0	400-900	0.0%
Folate, DFE	mcg_DFE	10	200-400	2.5%
Vitamin E (alpha-tocopherol)	mg	0.1	7-15	0.7%
Vitamin B-6	mg	0.109	0.6-1.7	6.4%

^aGrapefruit juice, white, frozen concentrate, unsweetened, diluted with 3 volume water. Source: <http://www.nal.usda.gov/fnic/foodcomp/search/> accessed January 30, 2007.

^bEnergy: estimated energy requirement for active persons with height 1.50m-1.80m.

^cFat: acceptable macronutrient for adults.

^dRDA in bold type and AI in ordinary type followed by an asterisk (*). Source: <http://www.iom.edu/Object.File/Master/21/372/0.pdf>, accessed 02-01-2007.

Appendix

Additional Nutrition Tables

Table A1. Contributions of beverage to nutrient intakes – by beverage group

	OJ	regular soft drinks	fruit drinks	presweetened tea	GJ	diet drinks	fruit/veg juices	plain milk	milk-based beverages	coffee	tea	meal replacement beverage	alcoholic beverages	other	Non-Bev
% of Sample Average Nutrient – Average of All Participants															
Vit A	0.95%	0.00%	0.58%	0.00%	0.00%	0.00%	0.65%	14.43%	6.47%	0.18%	0.00%	1.55%	0.02%	0.01%	75.10%
Vit E (ATOC)	1.98%	0.00%	1.12%	0.00%	0.01%	0.00%	0.27%	1.05%	1.30%	0.23%	0.00%	1.55%	0.03%	0.26%	92.44%
Vit C	23.72%	0.01%	20.07%	0.00%	0.52%	0.00%	6.94%	0.16%	0.89%	0.00%	0.00%	1.63%	0.16%	0.10%	45.77%
Folate (DFE)	2.61%	0.00%	0.31%	0.37%	0.03%	0.00%	0.25%	1.67%	0.60%	0.48%	0.44%	0.59%	0.83%	0.03%	91.78%
CALC	4.41%	0.70%	1.33%	0.04%	0.01%	0.25%	0.37%	23.83%	6.97%	0.77%	0.03%	1.28%	0.40%	0.06%	59.49%
POTA	4.56%	0.19%	1.07%	0.68%	0.10%	0.19%	2.10%	10.74%	3.90%	3.43%	0.74%	0.63%	1.00%	0.02%	70.57%
MAGN	2.76%	0.46%	1.12%	0.55%	0.07%	0.23%	0.92%	7.61%	3.25%	2.77%	0.61%	1.22%	1.90%	0.10%	76.39%
IRON	1.59%	1.83%	0.82%	0.07%	0.02%	0.36%	0.90%	0.35%	0.86%	0.26%	0.09%	0.96%	0.30%	0.02%	91.55%
ZINC	0.37%	0.67%	0.21%	0.08%	0.01%	0.05%	0.16%	6.48%	2.51%	0.36%	0.10%	0.72%	0.16%	0.04%	88.06%
Sodium	0.04%	0.56%	0.57%	0.05%	0.00%	0.15%	0.04%	2.31%	1.08%	0.16%	0.05%	0.25%	0.19%	0.05%	94.51%
Phosphorus	0.73%	1.39%	0.43%	0.04%	0.01%	0.42%	0.29%	13.43%	4.18%	0.60%	0.04%	0.69%	0.88%	0.03%	76.77%
Protein	0.50%	0.22%	0.06%	0.01%	0.01%	0.10%	0.12%	7.69%	2.25%	0.37%	0.00%	0.47%	0.36%	0.02%	87.78%
Carbohydrate	2.40%	10.69%	5.64%	0.90%	0.06%	0.06%	1.85%	3.17%	3.51%	0.18%	0.06%	0.63%	1.00%	0.18%	69.68%
Sugar	4.35%	20.77%	10.70%	1.75%	0.12%	0.00%	3.59%	7.25%	6.19%	0.25%	0.00%	0.84%	0.39%	0.32%	43.50%
Total Fats	0.11%	0.06%	0.05%	0.00%	0.00%	0.02%	0.06%	4.88%	3.68%	0.15%	0.00%	0.18%	0.02%	0.01%	90.75%
Sat Fats	0.04%	0.00%	0.04%	0.00%	0.00%	0.00%	0.03%	8.85%	6.81%	0.22%	0.00%	0.10%	0.03%	0.01%	83.83%
Cholesterol	0.00%	0.00%	0.01%	0.00%	0.00%	0.00%	0.00%	5.10%	3.80%	0.09%	0.00%	0.02%	0.02%	0.00%	90.94%
KCAL	1.30%	5.33%	2.85%	0.44%	0.03%	0.05%	0.96%	4.40%	3.28%	0.21%	0.03%	0.45%	2.19%	0.10%	78.36%
Fiber	0.89%	0.00%	0.49%	0.02%	0.01%	0.00%	0.38%	0.00%	2.65%	0.06%	0.01%	0.46%	0.02%	0.04%	94.97%
Vita B6	2.85%	0.00%	0.61%	0.01%	0.02%	0.00%	1.05%	3.68%	1.54%	0.12%	0.00%	0.85%	1.84%	0.77%	86.95%
α carotene	0.98%	0.00%	0.52%	0.00%	0.01%	0.00%	4.93%	0.00%	0.04%	0.00%	0.00%	0.02%	0.00%	0.00%	93.50%
β carotene	1.09%	0.00%	1.24%	0.00%	0.00%	0.00%	2.18%	0.36%	0.33%	0.01%	0.00%	0.46%	0.01%	0.00%	94.31%
Sample Size	2,191	4,296	3,101	1,038	59	1,060	1,618	4,692	3,217	2,717	1,057	574	1,189	85	7,275
% Sample	30.1%	59.1%	42.6%	14.3%	0.8%	14.6%	22.2%	64.5%	44.2%	37.3%	14.5%	7.9%	16.3%	1.2%	100.0%

Table A2. Nutrients in orange juice

Nutrient	Units	Raw	FCOJ	Chilled	Ca & D Fortified	Chilled (Calif.)
Proximates						
Water	g	218.98	219.37	220.12	220.12	220.12
Energy	kcal	112	112	110	110	110
Protein	g	1.74	1.69	1.99	1.99	1.99
Total lipid (fat)	g	0.5	0.15	0.67	0.67	0.67
Ash	g	0.99	0.97	1.2	1.2	1.2
Carbohydrate, by difference	g	25.79	26.84	25.05	25.05	25.05
Fiber, total dietary	g	0.5	0.5	0.5	0.5	
Sugars, total	g	20.83	20.92			
Sucrose	g		8.71			
Glucose (dextrose)	g		5.83			
Fructose	g		6.37			
Minerals						
Calcium, Ca	mg	27	22	25	351	25
Iron, Fe	mg	0.5	0.25	0.42	0.42	0.42
Magnesium, Mg	mg	27	25	27	27	27
Phosphorus, P	mg	42	40	27	27	27
Potassium, K	mg	496	473	473	473	473
Sodium, Na	mg	2	2	2	2	2
Zinc, Zn	mg	0.12	0.12	0.1	0.1	0.1
Copper, Cu	mg	0.109	0.11	0.1	0.1	0.1
Manganese, Mn	mg	0.035	0.035	0.057	0.057	0.057
Selenium, Se	mcg	0.2	0.2	0.2	0.2	
Fluoride, F	mcg		144.9			
Vitamins						
Vitamin C ^a	mg	124	96.9	81.9	81.9	106.3
Thiamin	mg	0.223	0.197	0.276	0.276	0.276
Riboflavin	mg	0.074	0.045	0.052	0.052	0.052
Niacin	mg	0.992	0.503	0.697	0.697	0.697
Pantothenic acid	mg	0.471	0.393	0.476	0.476	0.476
Vitamin B-6	mg	0.099	0.11	0.134	0.134	0.134
Folate, total	mcg	74	110	45	45	72
Folate, food	mcg	74	110	45	45	0
Folic acid	mcg	0	0	0		72
Folate, DFE	mcg_DFE	74	110	45		72
Vitamin A, IU	IU	496	266	194	194	364
Vitamin A, RAE	mcg_RAE	25	12	10	10	17
Vitamin E ^b	mg	0.1	0.5			
Tocopherol, gamma	mg		0.12			
Vitamin K	mcg	0.2	0.2			
Choline, total	mg			15.4		
Betaine	mg			0.5		
Vitamin D	IU				100	
Lipids						
Fatty acids ^c	g	0.06	0.017	0.072	0.072	0.072

^atotal ascorbic acid. ^balpha-tocopherol. ^ctotal saturated.

Table A3. Nutrients in grapefruit juice

Nutrient	Units	Pink, raw	White, raw	White, FCGJ
Proximates				
Water	g	222.3	222.3	220.57
Energy	kcal	96	96	101
Energy	kJ	403	403	425
Protein	g	1.24	1.24	1.36
Total lipid (fat)	g	0.25	0.25	0.32
Ash	g	0.49	0.49	0.69
Carbohydrate, by difference	g	22.72	22.72	24.03
Fiber, total dietary	g		0.2	0.2
Sugars, total	g		22.48	23.79
Minerals				
Calcium, Ca	mg	22	22	20
Iron, Fe	mg	0.49	0.49	0.35
Magnesium, Mg	mg	30	30	27
Phosphorus, P	mg	37	37	35
Potassium, K	mg	400	400	336
Sodium, Na	mg	2	2	2
Zinc, Zn	mg	0.12	0.12	0.12
Copper, Cu	mg	0.082	0.082	0.082
Manganese, Mn	mg	0.049	0.049	0.049
Selenium, Se	mcg		0.2	0.2
Vitamins				
Vitamin C ^a	mg	93.9	93.9	83.2
Thiamin	mg	0.099	0.099	0.101
Riboflavin	mg	0.049	0.049	0.054
Niacin	mg	0.494	0.494	0.536
Pantothenic acid	mg	0.467	0.467	0.467
Vitamin B-6	mg	0.109	0.109	0.109
Folate, total	mcg	25	25	10
Folate, food	mcg	25	25	10
Folate, DFE	mcg_DFE	25	25	10
Vitamin A, IU	IU	1087	82	22
Vitamin A, RAE	mcg_RAE	54	5	0
Vitamin E ^b	mg		0.54	0.1
Lipids				
Fatty acids ^c	g	0.035	0.035	0.047

^atotal ascorbic acid. ^balpha-tocopherol. ^ctotal saturated.