

## Appendix E-3.3 Vegetarian Food Patterns: Food Pattern Modeling Analysis

### RESEARCH QUESTION

How well do plant-based or vegetarian food patterns, adapted from the USDA food patterns, meet IOM Dietary Reference Intakes and potential DG 2010 nutrient recommendations? Model three scenarios: (1) Plant-based—more than 50% of all protein from plant sources; (2) Lacto-ovo vegetarian—only milk and egg products from animal sources; (3) Vegan—no animal products.

### BACKGROUND

(Note: Please see online Appendix E-3.1 *Adequacy of USDA Food Patterns* for more background information about development of the base USDA food patterns.)

The base USDA food patterns include 2 food groups that are primarily from animal sources: the Meat & Beans group and the Milk group. While each group contains some plant foods, the majority of consumption from these two groups is from animal products. The groups are the major sources of protein, calcium, vitamin D, vitamin B12, riboflavin, choline, selenium, zinc, and the omega-3 fatty acids EPA and DHA in the food patterns, as they are in American diets.

**Meat & Beans Group:** The Meat & Beans group is comprised of meats, poultry, fish, eggs, processed soy products, and nuts/seeds. Cooked dry beans and peas, because of their unique nutritional profile, can be classified as either a vegetable or as part of the Meat & Beans group. For food pattern calculations, cooked dry beans and peas are included as a subgroup in the vegetable group, but for dietary or menu analysis, they can be counted as either a vegetable or a meat alternate. Processed soy products (e.g., tofu, meat analogs) were previously classified along with other cooked dry beans and peas as either a vegetable or a meat alternate. They have been reclassified as part of the Meat & Beans group only, because processing reduces their fiber content. As with the milk group, calculation of the nutrient profile assumes a proportionate intake of each food category in the group that is equal to the proportion consumed by the population, as shown in Table 1.

**Table 1. Consumption percentages and amounts in base USDA food patterns of meats, poultry, fish, eggs, nuts and seeds, and processed soy products<sup>1</sup>**

Food Category	Percent of Consumption <sup>2</sup>	Ounce Equivalents in Base 2000 Kcal Food Pattern
Meats (beef, pork, lamb, etc)	44.6%	2.45 oz eq
Poultry (chicken, turkey, etc.)	27.9%	1.53 oz eq
Fish (high omega 3)	2.2%	0.12 oz eq
Fish (low omega 3)	7.1%	0.39 oz eq
Eggs	7.9%	0.44 oz eq
Nuts/Seeds	9.4%	0.52 oz eq
Processed soy products (tofu, meat analogs, TVP)	0.9%	0.05 oz eq
<b>Total</b>	<b>100.0%</b>	<b>5.5 oz eq</b>

<sup>1</sup> Cooked dry beans and peas are also considered part of the Meat and Beans group, but consumption amounts in the base patterns are counted in the Vegetable group.

<sup>2</sup> From NHANES 2003-04 data.

Food items used in calculating the nutrient profile for the Meat & Beans food group were classified into 74 item clusters and an “ideal” representative food in a nutrient dense form was selected for each. For example, top sirloin with lean only eaten and baked chicken meat without skin are used to represent beef and chicken, respectively.

Amounts of representative foods that count as one ounce-equivalent in the Meat & Beans group are determined by identifying the amount that approximates the nutrient content of one ounce of lean meat, poultry, and fish. Protein and energy content were the primary comparators. A comparison of protein and energy in one ounce-equivalent of each food category in the Meat & Beans group is shown in Table 2.

**Table 2. Energy and protein content of one ounce equivalent of food categories in the USDA food patterns Meat & Beans group**

Food Category	Amount Counted as 1 Ounce Equivalent	Energy (kcal)	Protein (g)
Meats (beef, pork, lamb, etc)	1 ounce	49	7.3
Poultry (chicken, turkey, etc.)	1 ounce	50	7.8
Fish (high omega 3)	1 ounce	51	6.5
Fish (low omega 3)	1 ounce	33	6.4
Eggs	1 egg	78	6.3
Nuts/Seeds	1/2 ounce	87	3.2
Processed soy products (tofu, meat analogs, Textured Vegetable Protein)	¼ cup tofu (other products vary)	49	4.5
Dry beans and peas	¼ cup cooked <sup>1</sup>	61	4.0

<sup>1</sup> Cooked dry beans and peas can be counted as a vegetable or as a meat alternate. The amount shown here is the equivalency for use in the Meat & Beans group only.

**Milk Group:** The milk group is comprised of milk, products made from milk that retain calcium content, such as yogurt and cheese, and calcium-fortified soymilk. To evaluate the nutrient adequacy of the USDA food patterns, a nutrient profile for the Milk group has been calculated to represent the nutrients that would be obtained from consuming one cup-equivalent from the group. Calculation of the nutrient profile assumes an intake of each food category in the group equal to the proportion consumed by the population, as shown in Table 3.

**Table 3. Consumption percentages and amounts of milk, cheese, yogurt, and soymilk in USDA food patterns**

Food Category	Percent of Milk Group Consumption <sup>1</sup>	Cup Equivalents in Base 2000 Kcal Food Pattern
Milk, fluid and dry (incl. flavored milk, milk as an ingredient, ice cream, frozen yogurt)	54.6%	1.64 cup eq
Cheese (natural and process, including cheese as an ingredient)	42.7%	1.28 cup eq
Yogurt	1.6%	0.05 cup eq
Calcium-fortified Soymilk	1.1%	0.03 cup eq
<b>Total</b>	<b>100%</b>	<b>3.00 cup eq</b>

<sup>1</sup> From NHANES 2003-04 data.

Food items used in calculating the nutrient profile for the Milk group were classified into 65 item clusters, representing types of foods consumed and fat level of the milk group component. Twelve “ideal” foods in nutrient-dense forms were selected to represent the 65 clusters. Nutrient-dense forms are those with minimal solid fat content and no added sugars. For example, fat-free milk and lowfat processed American cheese are used to represent fluid milks and processed cheeses, respectively. Amounts that count as one cup-equivalent are determined primarily based on calcium content, to approximate the calcium content in 1 cup of milk. For example, 1 cup of milk, yogurt, or calcium-fortified soymilk, 1½ ounces of natural cheese, and 2 ounces of processed cheese are considered 1 cup-equivalent.

Based on an analysis using NHANES 1999-2004 data (Famer, 2009), the unweighted percentage of vegetarians in the sample population was about 6% (851 of 13,292). While the number of vegetarians has increased since the original development of the food patterns, data on their food intake are insufficient to develop separate patterns based on actual proportionate consumption of plant foods in the Meat & Beans and Milk groups. Therefore, this analysis was conducted to test the assumption that individuals wanting to consume a plant-based diet, lacto-ovo vegetarians, and vegans could use the USDA food patterns, modified to (1) lower or eliminate some or all animal products and (2) substitute additional plant foods with similar nutrient content. The analysis was designed to determine the amounts and proportions of foods to include in the Meat & Beans and Milk groups to create food patterns that meet nutrient recommendations, without altering the calorie level of the pattern, under 3 conditions:

- Plant-based—50% of all protein in the patterns from plant foods
- Lacto-ovo vegetarian—eliminate all animal products except eggs and milk
- Vegan—eliminate all animal products

NOTE: When referred to collectively, these three modifications will be called the "vegetarian patterns."

## **METHODS**

1. Used the USDA food patterns at 12 calorie levels, with nutrient profiles based on NHANES 2003-2004, 2-day dietary consumption data and USDA National Nutrient Database for Standard Reference (SR), Release 22 (2009) nutrient data, as the basis for this analysis.
2. Modified the foods and/or subgroup amounts recommended from the Meat & Beans and Milk groups in the base USDA food patterns, while maintaining overall food group amounts:
  - a. Plant-based: Decreased amounts of meats and poultry and increased amounts of processed soy products, cooked dry beans and peas, and nuts to compensate, so that 50% of all protein in pattern was plant-based.
  - b. Lacto-ovo: Eliminated all meats, poultry, and fish from patterns and increased amounts of soy products, cooked dry beans and peas, nuts, and to a lesser extent eggs, to compensate.
  - c. Vegan: Eliminated all meats, poultry, fish, eggs, milk, and milk products from patterns and increased amounts of soy products (including calcium-fortified soy products), cooked dry beans and peas, and nuts and seeds to compensate.

3. Used an iterative process to determine proportionate amounts from each food category that could be included to meet nutrient goals in the food patterns at 12 calorie levels. To balance the calories from the larger amount of nuts included in the vegetarian patterns, amounts of oils were reduced to maintain an isocaloric energy level. The total amounts from the Meat & Beans and Milk groups at each calorie level were kept the same as the amount in the base USDA pattern.
4. Rounded weekly amounts to whole or half-ounce equivalents for each subgroup within the Meat & Beans group. This was intended to make any final recommendation easier to translate into consumer terms. In determining cooked dry beans and peas recommendations, considered the total amount of cooked dry beans and peas from the Meat & Beans group and the Vegetable group together (i.e., summed to create weekly totals in divisible portions).
5. Qualitatively reviewed food patterns for face validity, in terms of relative amounts recommended across calorie levels and in overall reasonableness of the patterns.
6. Assessed nutrient adequacy of the food patterns in comparison to Dietary Reference Intakes and potential 2010 Dietary Guidelines. Identified changes in nutrient amounts, and nutrient goals that are met or not met for the pattern at each calorie level. This included an analysis of essential amino acids and iron bioavailability.
7. (Not completed yet—will be done at a later date.) Develop sample menus at several calorie levels for each food pattern.

## RESULTS

### Food group amounts for all patterns

In the Base patterns, the percentage of protein from plant sources ranged from 30 to 41%. For the Plant-Based patterns the amounts of meats and poultry were modified iteratively until protein from plant sources was increased to 50% of the total protein in patterns at almost all calorie levels. Table A1 identifies the amounts and percentages of protein from animal and plant sources in the Base, Plant-Based, Lacto-Ovo, and Vegan patterns at all calorie levels.

For the Plant-Based patterns, proportionate amounts of meats and poultry were decreased substantially, while soy, nuts, and cooked dry beans and peas were increased substantially, as shown in Table 4. Amounts of eggs were left unchanged, and amounts of fish were increased somewhat. While fish are not a plant-based food, their current intake is low, and many individuals trying to eat less meat may increase fish consumption, as well as consumption of plant foods.

In the Lacto-Ovo patterns, the entire amounts from the Meat and Beans group were divided among eggs, processed soy products, nuts/seeds, and cooked dry beans and peas (Table 4). Amounts of eggs were increased only slightly, while amounts of nuts/seeds, soy, and cooked dry beans and peas were increased substantially. Nuts were increased to the highest percentage (35%) because they already make up about 10% of actual consumption from the Meat and Beans group.

In the Vegan patterns, the total amount from the Meat and Beans group was divided among processed soy products, nuts/seeds, and cooked dry beans and peas (Table 4). More nuts (40%) and cooked dry beans and peas (35%) were included than processed soy products (25%), since calcium-fortified soy products were also being used as part of the vegan milk group.

**Table 4. Proportions of Meat & Beans group components in the base USDA patterns and 3 vegetarian variations**

Food Category	Base USDA Patterns	Plant-based Patterns	Lacto-ovo Patterns	Vegan Patterns
Meats (beef, pork, lamb, etc)	44.6%	10.5%	0	0
Poultry (chicken, turkey, etc.)	27.9%	8.0%	0	0
Fish (high omega 3)	2.2%	3.0%	0	0
Fish (low omega 3)	7.1%	10.0%	0	0
Eggs	7.9%	7.6%	10%	0
Processed soy products	0.9%	15.0%	30%	25%
Nuts/Seeds	9.4%	20.9%	35%	40%
Dry beans and peas	N/A <sup>1</sup>	25.0%	25%	35%
<b>Total</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>

<sup>1</sup> Cooked dry beans and peas are included in the base patterns as a vegetable subgroup.

As was shown in Table 2, the calories provided by one ounce equivalent of cooked dry beans and peas and nuts is higher than the calories in one ounce equivalent of meat or poultry. In order to keep the patterns isocaloric while substituting cooked dry beans and peas and nuts for meat and poultry, other changes were needed. The primary strategy used to keep the patterns isocaloric was to decrease the amount of oils in the patterns to compensate for the oil content of the nuts added to the patterns. The amount of oils in each pattern was decreased by 3.9 grams (38 kcal) per oz eq of nuts in the pattern to maintain isocaloric levels. This amount of oil represents the calorie difference between 1 ounce equivalent of nuts and one ounce equivalent of lean meat (see Table 2).

Table 5 shows the amounts of each component of the Meat & Bean group in the base and vegetarian patterns at the reference 2000-calorie level. Final food group amounts used to calculate nutrients in patterns at all calorie levels are shown in Tables B1, B2, and B3.

**Table 5. Amounts from the Meat & Beans group components for the base USDA pattern and 3 vegetarian variations at a reference 2000 calorie level**

Food Category	Base USDA Pattern	Plant-based Pattern	Lacto-ovo Pattern	Vegan Pattern
Meats (beef, pork, lamb, etc)	2.45 (17.0) <sup>1</sup>	0.58 (4.0)	0 (0)	0 (0)
Poultry (chicken, turkey, etc.)	1.53 (10.7)	0.44 (3.1)	0 (0)	0 (0)
Fish (high omega 3)	0.12 (0.8)	0.17 (1.2)	0 (0)	0 (0)
Fish (low omega 3)	0.39 (2.7)	0.55 (3.9)	0 (0)	0 (0)
Eggs	0.44 (3.1)	0.42 (2.9)	0.55 (3.9)	0 (0)
Processed soy products	0.05 (0.4)	0.83 (5.8)	1.65 (11.6)	1.38 (9.7)
Nuts/Seeds <sup>2</sup>	0.52 (3.6)	1.15 (8.1)	1.90 (13.3)	2.20 (15.4)
Dry beans and peas <sup>3</sup>	N/A	1.38 (9.7)	1.38 (9.7)	1.93 (13.5)
<b>Total per day</b>	<b>5.5 oz eq</b>	<b>5.5 oz eq</b>	<b>5.5 oz eq</b>	<b>5.5 oz eq</b>

<sup>1</sup> Ounce equivalents per day (approximate amount per week)

<sup>2</sup> Each ounce equivalent of nuts = 1/2 ounce of nuts, so the 2000 calorie patterns contain from 2 ounces of nuts in the base pattern to 7 ounces of nuts in the vegan pattern per week.

<sup>3</sup> Cooked dry beans and peas are included in the base patterns as a Vegetable subgroup rather than in the Meat and Beans subgroup. Amounts shown here are additional cooked dry beans and peas added to the patterns, in ounce equivalents. One ounce equivalent of cooked dry beans and peas is 0.25 cup. These amounts do not include about 1.5 cups per week of cooked dry beans and peas as a vegetable in all of the 2000 calorie patterns.

The milk group was not modified except in the vegan patterns. In the vegan milk group, all recommended amounts were assigned to calcium-fortified products that might reasonably be substituted for milk, cheese, and yogurt. The specific items used for the vegan milk group nutrient profile were selected from among those in the SR22 database that were fortified or prepared with calcium to approximate the amount of calcium in 1 cup of milk in a common portion size. Caloric level and completeness of nutrient data and were also considered in the selection process. Calcium-fortified soymilk, calcium-fortified rice milk, tofu prepared with calcium sulfate, and calcium-fortified soy yogurt were used in proportions of 67% soymilk, 16% rice milk, 15% tofu, and 2% soy yogurt (Table 6). The amount of tofu was kept relatively low, because tofu was also included as a vegan option in the Meat and Beans group, as noted above. The amount of soy yogurt approximated the amount of yogurt in the base patterns (2%) and was not increased, because the caloric level of the soy yogurt selected for inclusion was substantially higher than comparable dairy-based plain yogurt. Therefore, the proportional amounts of calcium-fortified soy and rice milks together (83%) were greater than the proportionate intake of fluid milk (52%).

**Table 6. Proportions of milk products and calcium-fortified soy products in the base USDA pattern and 3 vegetarian variations**

Food Category	Base USDA Patterns	Plant-based Patterns	Lacto-ovo Patterns	Vegan Patterns
Fluid Milk	54.6%	54.6%	54.6%	0%
Yogurt	1.6%	1.6%	1.6%	0%
Cheese	42.7%	42.7%	42.7%	0%
Calcium-fortified soymilk	1.1%	1.1%	1.1%	67%
Calcium-fortified rice milk	0%	0%	0%	16%
Calcium-fortified tofu	0%	0%	0%	15%
Calcium-fortified soy yogurt	0%	0%	0%	2%
<b>Total</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>

The amounts of each component of the milk group in the base and vegetarian patterns at 2000 calories are shown in Table 7. Amounts in patterns at all calorie levels are shown in Tables B1, B2, and B3.

**Table 7. Amounts from the Milk Group for the base USDA pattern and 3 vegetarian variations in a reference 2000 calorie level**

Food Category	Base USDA Pattern	Plant-based Pattern	Lacto-ovo Pattern	Vegan Pattern
Fluid Milk	1.64 (11.5) <sup>1</sup>	1.64 (11.5)	1.64 (11.5)	0 (0)
Yogurt	.05 (0.4)	.05 (0.4)	.05 (0.4)	0 (0)
Cheese	1.28 (9.0) <sup>2</sup>	1.28 (9.0)	1.28 (9.0)	0 (0)
Calcium-fortified soymilk	0.03 (.21)	0.03 (.21)	0.03 (.21)	2.01 (14.1)
Calcium-fortified rice milk	0 (0)	0 (0)	0 (0)	0.48 (3.4)
Calcium-fortified tofu <sup>3</sup>	0 (0)	0 (0)	0 (0)	0.45 (3.2)
Calcium-fortified soy yogurt	0 (0)	0 (0)	0 (0)	0.06 (0.4)
<b>Total per day</b>	<b>3 cup eq</b>	<b>3 cup eq</b>	<b>3 cup eq</b>	<b>3 cup eq</b>

<sup>1</sup> Cup equivalents per day (approximate amount per week).

<sup>2</sup> 1.4 cup equivalent of cheese equals 2 ounces of cheese.

<sup>3</sup> 3 ounces of tofu = 1 cup equivalent, so 3 cup equivalents per week are about 9 ounces of tofu.

To quantitatively test the face validity of the food patterns with these modifications, sample food choices from the meat and beans group for a week were identified for each vegetarian pattern at the 2000 calorie level. CNPP nutritionists were able to identify sample food choices (not shown) that were reasonable and varied, and matched the amounts of each food group component listed in Tables 5 and 7. Full menus incorporating these choices will be developed at a later time.

### Nutrients in the Plant-Based, Lacto-Ovo, and Vegan Patterns

The plant-based, lacto-ovo vegetarian, and vegan food patterns met almost all goals for nutrient adequacy, paralleling the USDA Base patterns. The amounts and percents of goals for selected nutrients in the 2000 calorie level pattern are presented in Table 8. Nutrients and percents of goals for all calorie levels and nutrients are presented in Tables C1 and C2.

**Table 8. Selected nutrients in the base food patterns and 3 vegetarian variations, at the reference 2000 calorie level, and comparison to goals for females 19-30**

Food Pattern	USDA Base Pattern	Plant-based Pattern	Lacto-ovo Pattern	Vegan Pattern
<b>Macronutrients</b>				
Energy	1997	1998	2005	2015
% of goal	99.8%	99.9%	100.3%	100.7%
Protein	91 g	81 g	76 g	67 g
% of RDA	198%	176.6%	165.5%	145.6%
% of calories	18.2%	16.2%	15.2%	13.3%
Total lipid (fat)	71 g	69 g	70 g	75 g
% of calories	32%	30.9%	31.4%	33.3%
Carbohydrate	260 g	279 g	284 g	286 g
% of RDA	200%	214.5%	218.5%	220.1%
% of calories	52.1%	55.9%	56.7%	56.8%
Fiber, total dietary	30 g	37 g	39 g	43 g
% of goal (14 g/1000 kcal)	106%	131%	137.9%	154.3%
<b>Minerals</b>				
Calcium	1235 mg	1303 mg	1345 mg	1338 mg
% of AI	124%	130.3%	134.5%	133.8%
Iron	17 mg	18 mg	18 mg	23 mg
% of RDA	94%	99%	99.9%	125.4%
Magnesium	351 mg	396 mg	417 mg	479 mg
% of RDA	113%	127.8%	134.6%	154.6%
Potassium	3478 mg	3611 mg	3610 mg	3645 mg
% of AI	74%	76.8%	76.8%	77.5%
Sodium	1722 mg	1582 mg	1595 mg	1224 mg
% of UL	75%	68.8%	69.4%	53.2%
<b>Vitamins</b>				
Vitamin A (in µg RAE)	851 µg	822 µg	816 µg	822 µg
% of RDA	122%	117.5%	116.6%	117.4%
Vitamin E (in mg AT)	8.3 mg	8.7 mg	9.0 mg	10.0 mg
% of RDA	55%	57.7%	60.1%	66.8%
Vitamin D	258 IU	256 IU	230 IU	318 IU
% of RDA	129%	127.9%	114.8%	158.9%

**Table 8 (continued). Selected nutrients in the base food patterns and 3 vegetarian variations, at the reference 2000 calorie level, and comparison to goals for females 19-30 (continued)**

<b>Food Pattern</b>	<b>USDA Base Pattern</b>	<b>Plant-based Pattern</b>	<b>Lacto-ovo Pattern</b>	<b>Vegan Pattern</b>
Vitamin C % of RDA	126 mg 168%	127 mg 169.9%	128 mg 170.6%	128 mg 170.5%
Folate ( in µg DFE) % of RDA	628 µg 157%	747 µg 186.8%	782 µg 195.5%	828 µg 207%
Vitamin B12 % of RDA	6.5 µg 272%	5.8 µg 243.7%	4.9 µg 203.7%	8.1 µg 336.1%
Choline % of AI	340 mg 80%	292 mg 68.7%	287 mg 67.6%	283 mg 66.5%
<b>Fats and Fatty Acids</b>				
Cholesterol % of limit (<300mg/day)	229 mg 76%	170 mg 56.5%	160 mg 53.4%	17 mg 5.7%
Saturated fatty acids % of calories	18.7 g 8.4%	17.3 g 7.8%	17.4 g 7.8%	15.3 g 6.8%
Monounsaturated fatty acids % of calories	26.1 g 12%	25.2 g 11.4%	26.4 g 11.8%	27.8 g 12.4%
Polyunsaturated fatty acids % of calories	20.9 g 9%	20.8 g 9.3%	21.0 g 9.4%	27.0 g 12.0%
EPA (20:5 n-3)	40 mg	50 mg	4 mg	3 mg
DHA (22:6 n-3)	86 mg	98 mg	11 mg	0 mg

In many cases, amounts of a nutrient in all patterns were well above the RDA or AI. While lower in the vegetarian patterns in comparison to the base patterns, amounts of protein, zinc, and selenium were adequate in all patterns. Amounts of riboflavin did not change notably. (Tables C1 and C2).

The amount of protein in an ounce equivalent of soy products, nuts, and cooked dry beans and peas is less than the protein in a comparable amount of meat, fish, or poultry (Table 2). Therefore, the overall protein levels in the patterns are lower with increasing amounts of plant products in the patterns. However, the amounts of protein in all patterns are well above the RDA. In the 2000 calorie pattern, amounts of protein in comparison to the RDA for women 19 to 30 range from 198% of the RDA in the base patterns down to 145.6% of the RDA in the vegan pattern. This is the lowest amount, as a percent of the RDA, in any of the patterns. In addition to overall protein, the amounts of essential amino acids in the vegetarian patterns were calculated and compared to the RDA for each. No pattern contained less than the RDA for the most limiting amino acid. Amounts of all essential amino acids in the vegetarian patterns are shown in Table D1, and a comparison to RDAs for each amino acid is in Table D2.

Other nutrients in the food patterns were just above or marginally below (90-99%) goal amounts for some age/gender groups. These include vitamin A and vitamin D. For the purpose of this analysis, values at or above 90% of goal (for RDA or AI) were considered adequate.

Nutrient goals for vitamin E, potassium, and choline were not met in the base or the vegetarian patterns at most calorie levels.



- Amounts of vitamin E achieved 90% of the RDA at the 3200 calorie level in the base and all vegetarian patterns and also at the 3000 calorie level in the vegan pattern. In comparison to the base pattern, amounts of vitamin E were about 2% of the RDA higher in the plant-based patterns, about 6% higher in the lacto-ovo patterns, and about 13% higher in the vegan patterns.
- Amounts of potassium were above 90% of the AI in the base and all vegetarian patterns at 2600 calories and above. Potassium levels were from about 3 to about 5% higher in the vegetarian patterns in comparison to the base patterns.
- In the vegan patterns choline recommendations were not met, and in all other patterns recommendations were met only for children up to age eight, and amounts of choline in the vegetarian patterns were about 10 to 16% of the AI lower in comparison to the base patterns. Although eggs were not eliminated except in the vegan pattern, all vegetarian patterns were lower in choline than the base patterns. This can be explained by the somewhat higher levels of choline in 1 ounce of poultry or lean meat (21 to 26 mg) in comparison to the choline in nuts and soy products (7 mg per ounce equivalent) that were substituted for the meats and poultry.

The vegetarian patterns were higher in carbohydrates, dietary fiber, iron, magnesium, vitamin E, and folate in comparison to the base patterns. These differences are largely due to the nutrient contributions of additional cooked dry beans and peas and nuts in the patterns. While the vegetarian patterns are somewhat lower in vitamin A than the base patterns (about 3 to 6% of the RDA), amounts are still at or above 90% of the RDA for all population groups.

The relative bioavailability of iron from vegetarian diets is lower than that from omnivorous diets. In a DRI report (IOM, 2001), it was estimated that bioavailability of iron from vegetarian diets is about 10%, in comparison to 18% from a “mixed Western diet” (p. 351). Therefore, the estimated available iron in the vegan patterns was calculated and compared to the RDAs for each population group. For children 1-3 and 4-8, girls 14-18, and women 19-50, the amounts provided by vegan patterns at appropriate calorie levels are less than their RDA. For example, with adjustment for lower bioavailability, the amount of iron in the 2000 calorie pattern is reduced from 23 to 13 mg, in comparison to the RDA for women 19-30 of 18 mg. Adjusted amounts in all patterns are shown in Table 9. This analysis was not conducted for the Plant-Based and Lacto-Ovo patterns, as it was not clear what the adjustment factor should be.

**Table 9. Amounts of iron in the Vegan patterns at all calorie levels and comparison to iron RDAs for appropriate population groups**

Food Pattern Calorie level	Comparison Population Group	RDA (mg)	Iron in pattern (mg)	Adjusted Iron in Pattern (mg)	Comparison to RDA (%)
1000	M/F 1-3	7	11	6	86%
1200	M/F 4-8	10	14	8	80%
1400	M/F 4-8	10	16	9	90%
1600	M/F 9-13	8	20	11	138%
1600	F 51-70	8	20	11	138%
1800	F 14-18	15	22	12	80%
1800	F 31-50	18	22	12	67%
2000	F 19-30	18	23	13	72%
2200	M 14-18	11	25	14	127%
2200	M 31-50	8	25	14	175%
2400	M 19-30	8	27	15	188%
2600 <sup>1</sup>	M 19-30	8	30	17	213%
2800 <sup>1</sup>	M 14-18	11	32	18	164%
3000 <sup>1</sup>	M 19-30	8	33	18	225%
3200 <sup>1</sup>	M 14-18	11	33	18	164%

<sup>1</sup> Patterns at these calorie levels are designated for more active members of the identified population group.

The vegetarian patterns are slightly higher in calcium than the base patterns, due to the inclusion of larger amounts of processed soy products in the Meat and Beans group, some of which are fortified with calcium. The amounts of soy products used as one cup equivalent in the “vegan milk group” were set to provide the same amount of calcium as milk, so any differences in calcium in the overall patterns are due to changes in other food groups. Vitamin D is also somewhat higher in the vegan pattern. This is because a larger proportion of the milk group was assigned to vitamin D-fortified products. In the base and other vegetarian patterns, amounts of fluid milk, which is fortified with vitamin D, provides about 55% of the total group intake, while in the vegan pattern the fluid soy and rice milks together provided about 83% of intake. Vitamin B12 sources in the vegan patterns were fortified processed soy products and fortified ready-to-eat cereals. For calcium, vitamin D, and vitamin B12, the vegan patterns would not have provided adequate amounts without the inclusion of fortified foods.

While no dietary standards exist for omega-3 fatty acids in the patterns, the levels of EPA and DHA were substantially lower in the plant-based, lacto-ovo, and especially the vegan patterns than in the base patterns.

It is important to note that the vegetarian patterns, and particularly the vegan patterns, rely on the use of fortified foods to meet nutrient adequacy standards for several nutrients. Fortified foods are included in the base patterns to a limited extent. This includes instances when the fortification is mandatory, as it is with vitamins A and D in fat-free milk or folate in refined grains. Some fortified foods are also included in the base patterns when they are clearly the market leader and stable over time in consumption patterns, such as ready-to-eat cereals that are fortified with moderate levels of vitamins and minerals. The small amounts of processed soy products in the base patterns are also fortified with vitamin B12 and, in some cases, with calcium. In the vegetarian patterns, larger quantities of these fortified soy products are included. In addition, in the vegan patterns only, calcium-fortified products were selected for a “vegan milk group.”

## Food Components to Limit

For moderation nutrients (e.g., sodium, saturated fat), adequacy was defined as any value up to the maximum allowed. All patterns provided less than 10% of calories from saturated fats. The base patterns contained 7.8 to 9.2% saturated fat, while the vegetarian patterns provided about 7.1 to 8.7% (plant-based and lacto-ovo) or 6.2 to 8.0% (vegan).

The vegan pattern was much lower in cholesterol than the other patterns, because there were no eggs in the patterns. However, none of the patterns exceeded the limit of <300 mg of cholesterol.

The vegan pattern was much lower in sodium than the other patterns, due to the lower sodium in the soy-based milk products in comparison to the base milk group nutrient profile. The base pattern milk nutrient profile provides 181 mg of sodium per cup equivalent. (If only fat-free milk were used to represent the milk group, the sodium would be 103 mg per cup equivalent.) The vegan milk group profile, in contrast, contains 79 mg of sodium per cup equivalent.

## SUMMARY

The base USDA food patterns can be adapted for use as a guide to healthy eating by those wanting to consume more or only plant-based foods, with limited impacts on nutrient adequacy. However, these patterns may or may not align with typical vegetarian diets in the US. Choices of plant foods should include foods fortified with vitamin B12, vitamin D, and calcium. Other nutrients that could be of concern if fewer or no animal products are consumed include choline, EPA, and DHA.

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**Table A1. Percentages of protein from plant and animal sources in all patterns**

**Base USDA Food Patterns**

<b>Calorie Level</b>	<b>Total Protein (g)</b>	<b>Plant Protein (g)</b>	<b>Plant Protein (% total)</b>	<b>Animal Protein (g)</b>	<b>Animal Protein (% total)</b>
1000	44	14	32%	30	68%
1200	55	18	33%	37	67%
1400	65	22	34%	43	66%
1600	83	25	30%	58	70%
1800	87	29	33%	58	67%
2000	91	30	33%	61	67%
2200	100	35	35%	65	65%
2400	106	39	37%	67	63%
2600	111	43	39%	68	61%
2800	118	47	40%	71	60%
3000	120	49	41%	71	59%
3200	120	49	41%	71	59%

**Plant-based Food Patterns**

<b>Calorie Level</b>	<b>Total Protein (g)</b>	<b>Plant Protein (g)</b>	<b>Plant Protein (% total)</b>	<b>Animal Protein (g)</b>	<b>Animal Protein (% total)</b>
1000	40	18	45%	22	55%
1200	49	24	49%	25	51%
1400	57	29	51%	28	49%
1600	74	35	47%	39	53%
1800	78	39	50%	39	50%
2000	81	41	51%	40	49%
2200	89	47	53%	42	47%
2400	94	51	54%	43	46%
2600	99	56	57%	43	43%
2800	105	61	58%	44	42%
3000	107	63	59%	44	41%
3200	107	63	59%	44	41%

**Table A1. Percentages of protein from plant and animal sources in all patterns—continued**

**Lacto-ovo Food Patterns**

<b>Calorie Level</b>	<b>Total Protein (g)</b>	<b>Plant Protein (g)</b>	<b>Plant Protein (% total)</b>	<b>Animal Protein (g)</b>	<b>Animal Protein (% total)</b>
<b>1000</b>	38	20	53%	18	47%
<b>1200</b>	46	27	59%	19	41%
<b>1400</b>	54	34	63%	20	37%
<b>1600</b>	69	40	58%	29	42%
<b>1800</b>	74	45	61%	29	39%
<b>2000</b>	76	47	62%	29	38%
<b>2200</b>	83	54	65%	29	35%
<b>2400</b>	88	58	66%	30	34%
<b>2600</b>	93	63	68%	30	32%
<b>2800</b>	98	68	69%	30	31%
<b>3000</b>	101	71	70%	30	30%
<b>3200</b>	101	71	70%	30	30%

**Vegan Food Patterns**

<b>Calorie Level</b>	<b>Total Protein (g)</b>	<b>Plant Protein (g)</b>	<b>Plant Protein (% total)</b>	<b>Animal Protein (g)</b>	<b>Animal Protein (% total)</b>
<b>1000</b>	33	33	100%	0	0%
<b>1200</b>	41	41	100%	0	0%
<b>1400</b>	48	48	100%	0	0%
<b>1600</b>	60	60	100%	0	0%
<b>1800</b>	65	65	100%	0	0%
<b>2000</b>	67	67	100%	0	0%
<b>2200</b>	74	74	100%	0	0%
<b>2400</b>	79	79	100%	0	0%
<b>2600</b>	84	84	100%	0	0%
<b>2800</b>	89	89	100%	0	0%
<b>3000</b>	91	91	100%	0	0%
<b>3200</b>	91	91	100%	0	0%

**Table B1. Plant-based food patterns: Daily amounts for food groups and weekly amounts of vegetable and meat & beans subgroups<sup>1</sup>**

Energy Level of Pattern	1,000	1,200	1,400	1,600	1,800	2,000	2,200	2,400	2,600	2,800	3,000	3,200
<b>Food Group</b>												
Fruits	1 c	1 c	1½ c	1½ c	1½ c	2 c	2 c	2 c	2 c	2½ c	2½ c	2½ c
Vegetables	1 c	1½ c	1½ c	2 c	2½ c	2½ c	3 c	3 c	3½ c	3½ c	4 c	4 c
-Dark green vegetables	½ c/wk	1 c/wk	1 c/wk	1½ c/wk	1½ c/wk	1½ c/wk	2 c/wk	2 c/wk	2½ c/wk	2½ c/wk	2½ c/wk	2½ c/wk
-Red/Orange vegetables	2½ c/wk	2½ c/wk	3 c/wk	3 c/wk	4 c/wk	5½ c/wk	5½ c/wk	6 c/wk	6 c/wk	7 c/wk	7 c/wk	7½ c/wk
-Dry beans & peas <sup>2</sup>	½ c/wk	½ c/wk	½ c/wk	1 c/wk	1½ c/wk	1½ c/wk	2 c/wk	2 c/wk	2½ c/wk	2½ c/wk	3 c/wk	3 c/wk
-Starchy vegetables	2 c/wk	3½ c/wk	3½ c/wk	4 c/wk	5 c/wk	5 c/wk	6 c/wk	6 c/wk	7 c/wk	7 c/wk	8 c/wk	8 c/wk
-Other vegetables	1½ c/wk	2½ c/wk	2½ c/wk	3½ c/wk	4 c/wk	4 c/wk	5 c/wk	5 c/wk	5½ c/wk	5½ c/wk	7 c/wk	7 c/wk
Grains	3 oz eq	4 oz eq	5 oz eq	5 oz eq	6 oz eq	6 oz eq	7 oz eq	8 oz eq	9 oz eq	10 oz eq	10 oz eq	10 oz eq
-Whole grains	1½ oz eq	2 oz eq	2½ oz eq	3 oz eq	3 oz eq	3 oz eq	3½ oz eq	4 oz eq	4½ oz eq	5 oz eq	5 oz eq	5 oz eq
-Other grains	1½ oz eq	2 oz eq	2½ oz eq	2 oz eq	3 oz eq	3 oz eq	3½ oz eq	4 oz eq	4½ oz eq	5 oz eq	5 oz eq	5 oz eq
Meat & Beans	2 oz eq	3 oz eq	4 oz eq	5 oz eq	5 oz eq	5½ oz eq	6 oz eq	6½ oz eq	6½ oz eq	7 oz eq	7 oz eq	7 oz eq
-Meats	1 oz eq/wk	2 oz eq/wk	3 oz eq/wk	4 oz eq/wk	4 oz eq/wk	4 oz eq/wk	4 oz eq/wk	5 oz eq/wk	5 oz eq/wk	5 oz eq/wk	5 oz eq/wk	5 oz eq/wk
-Poultry	1 oz eq/wk	2 oz eq/wk	2 oz eq/wk	3 oz eq/wk	3 oz eq/wk	3 oz eq/wk	3 oz eq/wk	4 oz eq/wk	4 oz eq/wk	4 oz eq/wk	4 oz eq/wk	4 oz eq/wk
-Fish (all)	1 oz eq/wk	3 oz eq/wk	4 oz eq/wk	5 oz eq/wk	5 oz eq/wk	5 oz eq/wk	5 oz eq/wk	6 oz eq/wk	6 oz eq/wk	6 oz eq/wk	6 oz eq/wk	6 oz eq/wk
-Eggs	1 oz eq/wk	2 oz eq/wk	2 oz eq/wk	3 oz eq/wk	3 oz eq/wk	3 oz eq/wk	3 oz eq/wk	3 oz eq/wk	3 oz eq/wk	4 oz eq/wk	4 oz eq/wk	4 oz eq/wk
-Dry beans & peas <sup>2</sup>	3½ oz eq/wk	5 oz eq/wk	7 oz eq/wk	9 oz eq/wk	9 oz eq/wk	10 oz eq/wk	10 oz eq/wk	11 oz eq/wk	11 oz eq/wk	12 oz eq/wk	12 oz eq/wk	12 oz eq/wk
-Soy products	2 oz eq/wk	3 oz eq/wk	4 oz eq/wk	5 oz eq/wk	5 oz eq/wk	6 oz eq/wk	6 oz eq/wk	7 oz eq/wk	7 oz eq/wk	7 oz eq/wk	7 oz eq/wk	7 oz eq/wk
-Nuts & Seeds	3 oz eq/wk	4 oz eq/wk	6 oz eq/wk	7 oz eq/wk	7 oz eq/wk	8 oz eq/wk	9 oz eq/wk	10 oz eq/wk	10 oz eq/wk	10 oz eq/wk	10 oz eq/wk	10 oz eq/wk
Milk	2 c	2 c	2 c	3 c	3 c	3 c	3 c	3 c	3 c	3 c	3 c	3 c
Oils	13 g	15 g	14 g	18 g	20 g	23 g	24 g	26 g	29 g	30 g	38 g	45g
<b>Limit for SoFAS</b>	137 kcal	137 kcal	137 kcal	121 kcal	161 kcal	258 kcal	266 kcal	330 kcal	362 kcal	395 kcal	459 kcal	596 kcal

<sup>1</sup>Daily Amount of Food From Each Group (vegetable and meat & beans subgroup amounts are per week).

<sup>2</sup>Total recommended cooked dry beans and peas amounts would be the sum of amounts recommended in the vegetable and the meat & beans groups. An ounce eq of cooked dry beans and peas in the meat & beans group is ¼ cup. For example, in the 2000 calorie pattern, total weekly cooked dry beans and peas recommendation is (10 oz eq /4) + 1.5 cups = ~4 cups.

**Table B2. Lacto-ovo food patterns: Daily amounts for food groups and weekly amounts of vegetable and meat & beans subgroups<sup>1</sup>**

Energy Level of Pattern	1,000	1,200	1,400	1,600	1,800	2,000	2,200	2,400	2,600	2,800	3,000	3,200
<b>Food Group</b>												
Fruits	1 c	1 c	1½ c	1½ c	1½ c	2 c	2 c	2 c	2 c	2½ c	2½ c	2½ c
Vegetables	1 c	1½ c	1½ c	2 c	2½ c	2½ c	3 c	3 c	3½ c	3½ c	4 c	4 c
-Dark green vegetables	½ c/wk	1 c/wk	1 c/wk	1½ c/wk	1½ c/wk	1½ c/wk	2 c/wk	2 c/wk	2½ c/wk	2½ c/wk	2½ c/wk	2½ c/wk
-Red/Orange vegetables	2½ c/wk	3 c/wk	3 c/wk	4 c/wk	5½ c/wk	5½ c/wk	6 c/wk	6 c/wk	7 c/wk	7 c/wk	7½ c/wk	7½ c/wk
-Dry beans & peas <sup>2</sup>	½ c/wk	½ c/wk	½ c/wk	1 c/wk	1½ c/wk	1½ c/wk	2 c/wk	2 c/wk	2½ c/wk	2½ c/wk	3 c/wk	3 c/wk
-Starchy vegetables	2 c/wk	3½ c/wk	3½ c/wk	4 c/wk	5 c/wk	5 c/wk	6 c/wk	6 c/wk	7 c/wk	7 c/wk	8 c/wk	8 c/wk
-Other vegetables	1½ c/wk	2½ c/wk	2½ c/wk	3½ c/wk	4 c/wk	4 c/wk	5 c/wk	5 c/wk	5½ c/wk	5½ c/wk	7 c/wk	7 c/wk
Grains	3 oz eq	4 oz eq	5 oz eq	5 oz eq	6 oz eq	6 oz eq	7 oz eq	8 oz eq	9 oz eq	10 oz eq	10 oz eq	10 oz eq
-Whole grains	1½ oz eq	2 oz eq	2½ oz eq	3 oz eq	3 oz eq	3 oz eq	3½ oz eq	4 oz eq	4½ oz eq	5 oz eq	5 oz eq	5 oz eq
-Other grains	1½ oz eq	2 oz eq	2½ oz eq	2 oz eq	3 oz eq	3 oz eq	3½ oz eq	4 oz eq	4½ oz eq	5 oz eq	5 oz eq	5 oz eq
Meat & Beans	2 oz eq	3 oz eq	4 oz eq	5 oz eq	5 oz eq	5½ oz eq	6 oz eq	6½ oz eq	6½ oz eq	7 oz eq	7 oz eq	7 oz eq
-Eggs	1 oz eq/wk	2 oz eq/wk	3 oz eq/wk	4 oz eq/wk	4 oz eq/wk	4 oz eq/wk	4 oz eq/wk	5 oz eq/wk	5 oz eq/wk	5 oz eq/wk	5 oz eq/wk	5 oz eq/wk
-Dry beans & peas <sup>2</sup>	3½ oz eq/wk	5 oz eq/wk	7 oz eq/wk	9 oz eq/wk	9 oz eq/wk	10 oz eq/wk	10 oz eq/wk	11 oz eq/wk	11 oz eq/wk	12 oz eq/wk	12 oz eq/wk	12 oz eq/wk
-Soy products	4 oz eq/wk	6 oz eq/wk	8 oz eq/wk	11 oz eq/wk	11 oz eq/wk	12 oz eq/wk	13 oz eq/wk	14 oz eq/wk	14 oz eq/wk	15 oz eq/wk	15 oz eq/wk	15 oz eq/wk
-Nuts & Seeds	5 oz eq/wk	7 oz eq/wk	10 oz eq/wk	12 oz eq/wk	12 oz eq/wk	13 oz eq/wk	15 oz eq/wk	16 oz eq/wk	16 oz eq/wk	17 oz eq/wk	17 oz eq/wk	17 oz eq/wk
Milk	2 c	2 c	2 c	3 c	3 c	3 c	3 c	3 c	3 c	3 c	3 c	3 c
Oils	12 g	13 g	12 g	15 g	17 g	19 g	21 g	22 g	25 g	26 g	34 g	41g
<b>Limit for SoFAS</b>	137 kcal	137 kcal	137 kcal	121 kcal	161 kcal	258 kcal	266 kcal	330 kcal	362 kcal	395 kcal	459 kcal	596 kcal

<sup>1</sup>Daily Amount of Food From Each Group (vegetable and meat & beans subgroup amounts are per week).



<sup>2</sup>Total recommended cooked dry beans and peas amounts would be the sum of amounts recommended in the vegetable and the meat & beans groups. An ounce eq of cooked dry beans and peas in the meat & beans group is  $\frac{1}{4}$  cup. For example, in the 2000 calorie pattern, total weekly cooked dry beans and peas recommendation is  $(10 \text{ oz eq} / 4) + 1.5 \text{ cups} = \sim 4 \text{ cups}$ .

**Table B3. Vegan food patterns: Daily amounts for food groups and weekly amounts of vegetable and meat & beans subgroups<sup>1</sup>**

Energy Level of Pattern	1,000	1,200	1,400	1,600	1,800	2,000	2,200	2,400	2,600	2,800	3,000	3,200
<b>Food Group</b>												
Fruits	1 c	1 c	1½ c	1½ c	1½ c	2 c	2 c	2 c	2 c	2½ c	2½ c	2½ c
Vegetables	1 c	1½ c	1½ c	2 c	2½ c	2½ c	3 c	3 c	3½ c	3½ c	4 c	4 c
-Dark green vegetables	½ c/wk	1 c/wk	1 c/wk	1½ c/wk	1½ c/wk	1½ c/wk	2 c/wk	2 c/wk	2½ c/wk	2½ c/wk	2½ c/wk	2½ c/wk
-Red/Orange vegetables	2½ c/wk	3 c/wk	3 c/wk	4 c/wk	5½ c/wk	5½ c/wk	6 c/wk	6 c/wk	7 c/wk	7 c/wk	7½ c/wk	7½ c/wk
-Dry beans & peas <sup>2</sup>	½ c/wk	½ c/wk	½ c/wk	1 c/wk	1½ c/wk	1½ c/wk	2 c/wk	2 c/wk	2½ c/wk	2½ c/wk	3 c/wk	3 c/wk
-Starchy vegetables	2 c/wk	3½ c/wk	3½ c/wk	4 c/wk	5 c/wk	5 c/wk	6 c/wk	6 c/wk	7 c/wk	7 c/wk	8 c/wk	8 c/wk
-Other vegetables	1½ c/wk	2½ c/wk	2½ c/wk	3½ c/wk	4 c/wk	4 c/wk	5 c/wk	5 c/wk	5½ c/wk	5½ c/wk	7 c/wk	7 c/wk
Grains	3 oz eq	4 oz eq	5 oz eq	5 oz eq	6 oz eq	6 oz eq	7 oz eq	8 oz eq	9 oz eq	10 oz eq	10 oz eq	10 oz eq
-Whole grains	1½ oz eq	2 oz eq	2½ oz eq	3 oz eq	3 oz eq	3 oz eq	3½ oz eq	4 oz eq	4½ oz eq	5 oz eq	5 oz eq	5 oz eq
-Other grains	1½ oz eq	2 oz eq	2½ oz eq	2 oz eq	3 oz eq	3 oz eq	3½ oz eq	4 oz eq	4½ oz eq	5 oz eq	5 oz eq	5 oz eq
“Meat & Beans”	2 oz eq	3 oz eq	4 oz eq	5 oz eq	5 oz eq	5½ oz eq	6 oz eq	6½ oz eq	6½ oz eq	7 oz eq	7 oz eq	7 oz eq
- Dry beans & peas <sup>2</sup>	5 oz eq/wk	7 oz eq/wk	10 oz eq/wk	12 oz eq/wk	12 oz eq/wk	13 oz eq/wk	15 oz eq/wk	16 oz eq/wk	16 oz eq/wk	17 oz eq/wk	17 oz eq/wk	17 oz eq/wk
-Soy products	4 oz eq/wk	5 oz eq/wk	7 oz eq/wk	9 oz eq/wk	9 oz eq/wk	10 oz eq/wk	11 oz eq/wk	11 oz eq/wk	11 oz eq/wk	12 oz eq/wk	12 oz eq/wk	12 oz eq/wk
-Nuts & Seeds	6 oz eq/wk	8 oz eq/wk	11 oz eq/wk	14 oz eq/wk	14 oz eq/wk	15 oz eq/wk	17 oz eq/wk	18 oz eq/wk	18 oz eq/wk	20 oz eq/wk	20 oz eq/wk	20 oz eq/wk
Milk	2 c	2 c	2 c	3 c	3 c	3 c	3 c	3 c	3 c	3 c	3 c	3 c
Oils	12 g	12 g	11 g	14 g	16 g	18 g	20 g	21 g	24 g	25 g	33 g	40g
<b>Limit for SoFAS</b>	137 kcal	137kcal	137kcal	121kcal	161kcal	258 kcal	266kcal	330 kcal	362 kcal	395 kcal	459 kcal	596 kcal

<sup>1</sup>Daily Amount of Food From Each Group (vegetable and meat & beans subgroup amounts are per week).

<sup>2</sup>Total recommended cooked dry beans and peas amounts would be the sum of amounts recommended in the vegetable and the meat & beans groups. An ounce eq of cooked dry beans and peas in the meat & beans group is ¼ cup. For example, in the 2000 calorie pattern, total weekly cooked dry beans and peas recommendation is (13 oz eq /4) + 1.5 cups = ~5 cups.

**Table C1. Summary of Nutrients in Base and Vegetarian Food Intake Patterns**

Calorie Level	Food Pattern	Energy kcal	Protein g	Total lipid g	Carbo-hydrate g	Dietary Fiber g	Calcium mg	Iron mg	Magnesium mg
1000	Base	992	44	36	128	14	751	8	169
1000	Plant-based	987	40	35	135	16	775	8	186
1000	Lacto-ovo	994	38	36	137	17	791	8	193
1000	Vegan	1005	33	40	137	19	790	11	230
1200	Base	1200	55	43	155	17	803	10	212
1200	Plant-based	1202	49	42	166	21	840	11	237
1200	Lacto-ovo	1208	46	43	169	22	863	11	249
1200	Vegan	1211	41	46	169	25	860	14	288
1400	Base	1389	65	47	184	21	849	13	250
1400	Plant-based	1405	57	45	203	26	898	13	284
1400	Lacto-ovo	1418	54	47	207	27	929	13	299
1400	Vegan	1422	48	50	208	30	924	16	341
1600	Base	1602	83	55	203	25	1184	15	310
1600	Plant-based	1608	74	53	221	31	1245	15	351
1600	Lacto-ovo	1620	69	55	226	33	1283	16	370
1600	Vegan	1629	60	60	227	37	1277	20	431
1800	Base	1797	87	61	234	28	1221	16	336
1800	Plant-based	1795	78	59	252	35	1283	17	378
1800	Lacto-ovo	1807	74	61	256	36	1321	17	396
1800	Vegan	1816	65	65	258	41	1315	22	457
2000	Base	1997	91	71	260	30	1235	17	351
2000	Plant-based	1998	81	69	279	37	1303	18	396
2000	Lacto-ovo	2005	76	70	284	39	1345	18	417
2000	Vegan	2015	67	75	286	43	1338	23	479
2200	Base	2190	100	77	287	34	1290	20	394
2200	Plant-based	2187	89	74	308	42	1364	21	444
2200	Lacto-ovo	2206	83	77	314	44	1410	21	467
2200	Vegan	2215	74	81	316	49	1402	25	530
2400	Base	2384	106	86	312	37	1323	21	418
2400	Plant-based	2392	94	83	334	45	1403	22	472
2400	Lacto-ovo	2406	88	85	341	47	1453	23	496
2400	Vegan	2415	79	90	344	52	1443	27	561
2600	Base	2583	111	92	343	41	1374	24	457
2600	Plant-based	2591	99	90	366	49	1454	25	511
2600	Lacto-ovo	2606	93	92	372	52	1503	25	536
2600	Vegan	2615	84	97	375	57	1494	30	600
2800	Base	2795	118	99	376	44	1416	26	491
2800	Plant-based	2789	105	94	401	53	1502	27	549
2800	Lacto-ovo	2808	98	97	407	56	1555	27	575
2800	Vegan	2817	89	102	411	61	1545	32	641
3000	Base	2985	120	111	396	47	1434	26	509
3000	Plant-based	2987	107	107	420	56	1520	28	567
3000	Lacto-ovo	3006	101	110	427	58	1574	28	593
3000	Vegan	3015	91	115	430	64	1563	33	659
3200	Base	3182	120	126	412	48	1435	26	509
3200	Plant-based	3176	107	122	437	56	1521	28	567
3200	Lacto-ovo	3195	101	125	444	59	1574	28	593
3200	Vegan	3204	91	129	447	64	1564	33	659

**Table C1. Summary of Nutrients in Base and Vegetarian Food Intake Patterns—continued**

Calorie Level	Food Pattern	Phosphorus mg	Potassium mg	Sodium mg	Zinc mg	Copper mg	Manganese mg	Selenium mcg	Vitamin A mcg RAE
1000	Base	886	1667	885	7	0.651	2	49	447
1000	Plant-based	888	1716	834	6	0.699	2	45	436
1000	Lacto-ovo	888	1715	838	6	0.727	2	42	434
1000	Vegan	604	1718	611	5	1.051	3	38	451
1200	Base	1052	2059	1088	9	0.851	2	64	527
1200	Plant-based	1054	2132	1011	8	0.924	3	58	511
1200	Lacto-ovo	1054	2131	1018	8	0.967	3	53	508
1200	Vegan	769	2146	779	7	1.302	4	48	516
1400	Base	1195	2374	1265	10	1.014	3	79	569
1400	Plant-based	1197	2470	1163	9	1.111	3	70	548
1400	Lacto-ovo	1197	2470	1173	9	1.168	4	63	544
1400	Vegan	910	2497	921	8	1.515	4	57	545
1600	Base	1562	2971	1527	13	1.212	3	95	756
1600	Plant-based	1565	3092	1402	12	1.333	4	84	732
1600	Lacto-ovo	1565	3092	1414	11	1.404	4	76	726
1600	Vegan	1137	3120	1048	10	1.913	5	67	736
1800	Base	1643	3272	1666	14	1.376	4	101	820
1800	Plant-based	1646	3392	1538	12	1.496	4	91	794
1800	Lacto-ovo	1646	3392	1550	12	1.568	5	82	788
1800	Vegan	1218	3420	1185	10	2.076	6	74	798
2000	Base	1690	3478	1722	14	1.446	4	106	851
2000	Plant-based	1694	3611	1582	13	1.578	4	94	822
2000	Lacto-ovo	1694	3610	1595	12	1.657	5	85	816
2000	Vegan	1264	3645	1224	11	2.172	6	75	822
2200	Base	1836	3836	1883	16	1.635	4	117	930
2200	Plant-based	1839	3981	1730	14	1.779	5	104	898
2200	Lacto-ovo	1839	3981	1745	14	1.865	6	94	892
2200	Vegan	1409	4021	1368	12	2.386	7	84	894
2400	Base	1932	3945	2028	17	1.727	5	127	969
2400	Plant-based	1936	4102	1865	15	1.884	6	113	937
2400	Lacto-ovo	1936	4102	1880	15	1.977	6	102	930
2400	Vegan	1505	4148	1497	13	2.503	7	91	928
2600	Base	2046	4275	2153	18	1.900	5	134	1056
2600	Plant-based	2050	4431	1989	16	2.056	6	120	1024
2600	Lacto-ovo	2050	4431	2005	16	2.150	7	109	1017
2600	Vegan	1619	4478	1622	14	2.676	8	98	1015
2800	Base	2156	4544	2296	19	2.037	6	144	1098
2800	Plant-based	2161	4713	2117	17	2.205	7	129	1060
2800	Lacto-ovo	2161	4712	2134	17	2.306	7	118	1053
2800	Vegan	1729	4765	1745	15	2.838	8	106	1047
3000	Base	2203	4780	2329	20	2.132	6	145	1133
3000	Plant-based	2208	4949	2153	18	2.301	7	130	1098
3000	Lacto-ovo	2208	4948	2170	17	2.401	7	119	1091
3000	Vegan	1776	5001	1781	16	2.933	8	107	1085
3200	Base	2204	4781	2353	20	2.132	6	145	1160
3200	Plant-based	2209	4950	2174	18	2.301	7	130	1122
3200	Lacto-ovo	2209	4949	2191	17	2.401	7	119	1114
3200	Vegan	1776	5002	1802	16	2.933	8	107	1109

**Table C1. Summary of Nutrients in Base and Vegetarian Food Intake Patterns—continued**

Calorie Level	Food Pattern	Vitamin E mg AT	Vitamin D IU	Vitamin C mg	Thiamin mg	Riboflavin mg	Niacin mg
1000	Base	4.0	155	58	0.9	1.2	9.9
1000	Plant-based	4.1	154	59	1.0	1.2	8.6
1000	Lacto-ovo	4.3	144	59	1.2	1.2	8.2
1000	Vegan	5.0	208	59	1.6	1.3	8.9
1200	Base	4.9	166	70	1.1	1.4	13.8
1200	Plant-based	5.1	165	70	1.4	1.4	11.9
1200	Lacto-ovo	5.3	151	71	1.7	1.4	11.3
1200	Vegan	5.9	211	71	2.0	1.5	12.0
1400	Base	5.4	177	89	1.3	1.6	17.1
1400	Plant-based	5.6	176	90	1.7	1.6	14.6
1400	Lacto-ovo	6.0	157	90	2.1	1.6	13.7
1400	Vegan	6.6	215	90	2.4	1.7	14.5
1600	Base	6.7	249	100	1.5	2.0	19.8
1600	Plant-based	7.0	248	101	2.0	2.0	16.6
1600	Lacto-ovo	7.4	224	102	2.4	2.0	15.5
1600	Vegan	8.4	314	102	2.9	2.2	16.7
1800	Base	7.6	252	108	1.7	2.2	21.8
1800	Plant-based	7.8	250	109	2.2	2.1	18.6
1800	Lacto-ovo	8.2	226	109	2.6	2.1	17.5
1800	Vegan	9.2	316	109	3.1	2.3	18.7
2000	Base	8.3	258	126	1.8	2.2	22.9
2000	Plant-based	8.7	256	127	2.3	2.2	19.4
2000	Lacto-ovo	9.0	230	128	2.8	2.2	18.2
2000	Vegan	10.0	318	128	3.3	2.4	19.4
2200	Base	9.1	266	137	2.0	2.4	25.8
2200	Plant-based	9.4	264	139	2.6	2.3	22.0
2200	Lacto-ovo	10.0	235	139	3.1	2.4	20.7
2200	Vegan	11.0	322	139	3.6	2.5	21.9
2400	Base	9.6	275	138	2.2	2.6	28.0
2400	Plant-based	10.0	273	140	2.8	2.5	23.9
2400	Lacto-ovo	10.6	242	140	3.4	2.5	22.5
2400	Vegan	11.6	327	140	3.8	2.7	23.7
2600	Base	10.6	279	149	2.4	2.7	30.1
2600	Plant-based	11.0	277	151	3.0	2.6	26.0
2600	Lacto-ovo	11.5	246	151	3.6	2.7	24.6
2600	Vegan	12.5	332	151	4.1	2.8	25.8
2800	Base	11.2	287	168	2.6	2.9	32.6
2800	Plant-based	11.6	285	170	3.3	2.8	28.2
2800	Lacto-ovo	12.2	252	171	3.9	2.8	26.7
2800	Vegan	13.2	336	171	4.3	3.0	27.9
3000	Base	12.5	289	175	2.7	2.9	33.3
3000	Plant-based	12.9	287	177	3.3	2.8	28.9
3000	Lacto-ovo	13.5	254	178	4.0	2.9	27.4
3000	Vegan	14.5	338	178	4.4	3.0	28.6
3200	Base	13.5	293	175	2.7	2.9	33.3
3200	Plant-based	13.9	290	177	3.3	2.8	28.9
3200	Lacto-ovo	14.5	257	178	4.0	2.9	27.4
3200	Vegan	15.5	341	178	4.4	3.0	28.6

**Table C1. Summary of Nutrients in Base and Vegetarian Food Intake Patterns—continued**

Calorie Level	Food Pattern	Vitamin	Vitamin	Choline	Vitamin K	Folate	Cholesterol
		B-6	B-12				
		mg	mcg	mg	mcg	mcg DFE	mg
1000	Base	1.1	3.3	155	58	295	94
1000	Plant-based	1.0	3.1	138	57	338	72
1000	Lacto-ovo	1.0	2.7	136	56	351	69
1000	Vegan	1.1	5.0	150	66	376	9
1200	Base	1.4	4.0	200	89	387	129
1200	Plant-based	1.3	3.6	174	88	452	96
1200	Lacto-ovo	1.3	3.1	171	87	471	91
1200	Vegan	1.4	5.3	175	96	499	10
1400	Base	1.7	4.7	238	92	467	164
1400	Plant-based	1.6	4.2	203	90	554	121
1400	Lacto-ovo	1.5	3.5	200	89	579	114
1400	Vegan	1.6	5.6	193	98	611	11
1600	Base	2.0	6.1	304	125	534	206
1600	Plant-based	1.9	5.5	261	124	643	153
1600	Lacto-ovo	1.8	4.7	257	122	675	144
1600	Vegan	1.9	7.9	257	136	718	12
1800	Base	2.2	6.3	320	134	614	208
1800	Plant-based	2.1	5.6	276	132	722	154
1800	Lacto-ovo	2.0	4.8	272	130	754	146
1800	Vegan	2.1	8.0	272	144	798	13
2000	Base	2.3	6.5	340	140	628	229
2000	Plant-based	2.2	5.8	292	138	747	170
2000	Lacto-ovo	2.1	4.9	287	135	782	160
2000	Vegan	2.2	8.1	283	150	828	17
2200	Base	2.6	7.0	372	175	736	248
2200	Plant-based	2.5	6.2	320	173	866	183
2200	Lacto-ovo	2.4	5.2	314	171	904	172
2200	Vegan	2.5	8.3	305	185	952	19
2400	Base	2.8	7.4	391	180	803	268
2400	Plant-based	2.6	6.6	335	178	943	198
2400	Lacto-ovo	2.5	5.5	330	175	985	187
2400	Vegan	2.6	8.6	315	189	1034	23
2600	Base	3.0	7.6	410	211	906	271
2600	Plant-based	2.8	6.8	353	209	1046	201
2600	Lacto-ovo	2.7	5.7	348	207	1088	189
2600	Vegan	2.9	8.8	333	221	1137	25
2800	Base	3.2	8.0	434	216	983	290
2800	Plant-based	3.1	7.2	373	213	1135	214
2800	Lacto-ovo	3.0	6.0	368	210	1180	202
2800	Vegan	3.1	9.0	348	224	1231	27
3000	Base	3.4	8.1	446	233	1015	292
3000	Plant-based	3.2	7.2	385	230	1167	217
3000	Lacto-ovo	3.1	6.0	379	227	1211	205
3000	Vegan	3.2	9.1	359	242	1262	30
3200	Base	3.4	8.1	447	243	1015	298
3200	Plant-based	3.2	7.3	386	240	1167	222
3200	Lacto-ovo	3.1	6.1	380	237	1212	210
3200	Vegan	3.2	9.1	360	251	1263	35

**Table C1. Summary of Nutrients in Base and Vegetarian Food Intake Patterns—continued**

Calorie Level	Food Pattern	Saturated fatty acids	Mono-unsaturated fatty acids	Poly-unsaturated fatty acids	18:2 Linoleic	18:3 Linolenic	20:5 n-3 EPA	22:6 n-3 DHA
		g	g	g	g	g	g	g
1000	Base	9.7	13.1	10.9	9.8	0.98	0.015	0.031
1000	Plant-based	9.1	12.6	10.6	9.6	0.93	0.019	0.036
1000	Lacto-ovo	9.2	13.2	10.9	9.9	0.91	0.002	0.004
1000	Vegan	8.1	14.4	15.1	12.7	1.24	0.001	0.000
1200	Base	11.2	15.7	12.8	11.5	1.13	0.022	0.047
1200	Plant-based	10.5	15.3	12.8	11.5	1.11	0.028	0.054
1200	Lacto-ovo	10.6	16.0	13.0	11.9	1.05	0.003	0.006
1200	Vegan	9.2	16.9	16.8	14.3	1.34	0.002	0.000
1400	Base	12.3	17.3	13.7	12.3	1.19	0.029	0.062
1400	Plant-based	11.2	16.6	13.6	12.2	1.14	0.037	0.071
1400	Lacto-ovo	11.4	17.8	14.1	13.0	1.09	0.003	0.008
1400	Vegan	9.9	18.6	18.0	15.5	1.39	0.002	0.000
1600	Base	14.0	20.0	16.4	14.7	1.45	0.037	0.078
1600	Plant-based	12.7	19.1	16.1	14.5	1.38	0.046	0.089
1600	Lacto-ovo	12.9	20.4	16.6	15.2	1.30	0.004	0.010
1600	Vegan	10.8	21.8	22.5	19.1	1.76	0.003	0.000
1800	Base	15.8	22.4	18.2	16.3	1.63	0.037	0.078
1800	Plant-based	14.5	21.5	18.0	16.1	1.55	0.046	0.089
1800	Lacto-ovo	14.6	22.8	18.4	16.9	1.47	0.004	0.010
1800	Vegan	12.6	24.2	24.4	20.8	1.93	0.003	0.000
2000	Base	18.7	26.1	20.9	18.7	1.85	0.040	0.086
2000	Plant-based	17.3	25.2	20.8	18.7	1.79	0.050	0.098
2000	Lacto-ovo	17.4	26.4	21.0	19.2	1.67	0.004	0.011
2000	Vegan	15.3	27.8	27.0	23.1	2.13	0.003	0.000
2200	Base	20.1	28.4	22.8	20.4	2.03	0.044	0.093
2200	Plant-based	18.5	27.3	22.3	20.1	1.93	0.055	0.107
2200	Lacto-ovo	18.8	29.0	23.1	21.2	1.86	0.005	0.012
2200	Vegan	16.6	30.4	29.2	25.1	2.33	0.004	0.000
2400	Base	22.5	31.4	25.0	22.4	2.20	0.048	0.101
2400	Plant-based	20.8	30.3	24.7	22.3	2.11	0.060	0.116
2400	Lacto-ovo	21.0	32.0	25.2	23.2	2.00	0.006	0.013
2400	Vegan	18.7	33.3	31.3	27.1	2.47	0.004	0.001
2600	Base	24.0	33.8	27.2	24.4	2.42	0.048	0.101
2600	Plant-based	22.4	32.7	26.9	24.3	2.33	0.060	0.116
2600	Lacto-ovo	22.5	34.4	27.5	25.2	2.22	0.006	0.013
2600	Vegan	20.3	35.7	33.5	29.1	2.69	0.005	0.001
2800	Base	25.7	36.2	29.1	26.2	2.57	0.052	0.109
2800	Plant-based	23.8	34.8	28.5	25.8	2.45	0.065	0.125
2800	Lacto-ovo	24.0	36.7	29.3	26.8	2.34	0.007	0.014
2800	Vegan	21.7	38.0	35.3	30.8	2.82	0.005	0.001
3000	Base	28.4	40.7	33.5	30.2	3.01	0.052	0.109
3000	Plant-based	26.5	39.3	32.9	29.7	2.89	0.065	0.125
3000	Lacto-ovo	26.8	41.1	33.7	30.8	2.78	0.007	0.014
3000	Vegan	24.5	42.5	39.7	34.8	3.25	0.005	0.001
3200	Base	32.6	46.1	38.2	34.4	3.42	0.052	0.109
3200	Plant-based	30.7	44.8	37.6	34.0	3.31	0.065	0.125
3200	Lacto-ovo	30.9	46.6	38.3	35.1	3.20	0.007	0.014
3200	Vegan	28.6	47.9	44.4	39.0	3.67	0.005	0.001

**Table C2. Comparison of Nutrients in Base and Vegetarian Food Intake Patterns to Goals**

Calorie Level	Food Pattern	% of goal for:	Energy % kcal	Protein % RDA	Carbo-hydrate % RDA	Dietary Fiber %goal <sup>1</sup>	Protein % of kcal	Carbo-hydrate % of kcal	Total lipid % kcal	Calcium % AI	Iron % RDA	Mag-nesium % RDA
1000	Base	M/F 1 to 3	99%	335%	99%	97%	18%	52%	33%	150%	110%	211%
1000	Plant-based	M/F 1 to 3	99%	307%	104%	115%	16%	55%	32%	155%	115%	232%
1000	Lacto-ovo	M/F 1 to 3	99%	293%	106%	120%	15%	55%	32%	158%	116%	241%
1000	Vegan	M/F 1 to 3	101%	250%	105%	138%	13%	54%	36%	158%	159%	288%
1200	Base	M/F 4 to 8	100%	287%	119%	104%	18%	52%	32%	100%	104%	163%
1200	Plant-based	M/F 4 to 8	100%	259%	128%	127%	16%	55%	31%	105%	109%	183%
1200	Lacto-ovo	M/F 4 to 8	101%	244%	130%	133%	15%	56%	32%	108%	110%	191%
1200	Vegan	M/F 4 to 8	101%	213%	130%	150%	13%	56%	34%	108%	140%	222%
1400	Base	M/F 4 to 8	99%	340%	142%	105%	19%	53%	31%	106%	126%	193%
1400	Plant-based	M/F 4 to 8	100%	303%	156%	131%	16%	58%	29%	112%	133%	218%
1400	Lacto-ovo	M/F 4 to 8	101%	283%	159%	139%	15%	58%	30%	116%	134%	230%
1400	Vegan	M/F 4 to 8	102%	250%	160%	155%	13%	59%	31%	115%	165%	262%
1600	Base	M/F 9 to 13	100%	243%	157%	110%	21%	51%	31%	91%	182%	129%
1600	Base	F 51 to 70	100%	180%	157%	110%	21%	51%	31%	99%	182%	97%
1600	Plant-based	M/F 9 to 13	101%	217%	170%	138%	18%	55%	30%	96%	192%	146%
1600	Plant-based	F 51 to 70	101%	160%	170%	138%	18%	55%	30%	104%	192%	110%
1600	Lacto-ovo	M/F 9 to 13	101%	203%	174%	146%	17%	56%	31%	99%	194%	154%
1600	Lacto-ovo	F 51 to 70	101%	150%	174%	146%	17%	56%	31%	107%	194%	116%
1600	Vegan	M/F 9 to 13	102%	177%	175%	166%	15%	56%	33%	98%	251%	180%
1600	Vegan	F 51 to 70	102%	131%	175%	166%	15%	56%	33%	106%	251%	135%
1800	Base	M/F 9 to 13	100%	256%	180%	112%	19%	52%	31%	94%	206%	140%
1800	Base	F 14-18	100%	189%	180%	112%	19%	52%	31%	94%	110%	93%
1800	Base	F 31-50	100%	189%	180%	112%	19%	52%	31%	122%	91%	105%
1800	Plant-based	M/F 9 to 13	100%	230%	194%	137%	17%	56%	29%	99%	216%	157%
1800	Plant-based	F 14-18	100%	170%	194%	137%	17%	56%	29%	99%	115%	105%
1800	Plant-based	F 31-50	100%	170%	194%	137%	17%	56%	29%	128%	96%	118%
1800	Lacto-ovo	M/F 9 to 13	100%	216%	197%	144%	16%	57%	30%	102%	218%	165%
1800	Lacto-ovo	F 14-18	100%	160%	197%	144%	16%	57%	30%	102%	116%	110%
1800	Lacto-ovo	F 31-50	100%	160%	197%	144%	16%	57%	30%	132%	97%	124%
1800	Vegan	M/F 9 to 13	101%	190%	199%	161%	14%	57%	32%	101%	275%	191%
1800	Vegan	F 14-18	101%	140%	199%	161%	14%	57%	32%	101%	147%	127%
1800	Vegan	F 31-50	101%	140%	199%	161%	14%	57%	32%	132%	122%	143%

<sup>1</sup>Goal for fiber is 14 grams per 1000 calories.



**Table C2. Comparison of Nutrients in Base and Vegetarian Food Intake Patterns to Goals—continued**

Calorie Level	Food Pattern	% of goal for:	Energy % kcal	Protein % RDA	Carbo-hydrate % RDA	Dietary Fiber <sup>1</sup> %goal	Protein % of kcal	Carbo-hydrate % of kcal	Total lipid % kcal	Calcium % AI	Iron % RDA	Mag-nesium % RDA
2000	Base	M 51-70	100%	163%	200%	106%	18%	52%	32%	103%	211%	83%
2000	Base	F19-30	100%	198%	200%	106%	18%	52%	32%	124%	94%	113%
2000	Plant-based	M 51-70	100%	145%	214%	131%	16%	56%	31%	109%	223%	94%
2000	Plant-based	F19-30	100%	177%	214%	131%	16%	56%	31%	130%	99%	128%
2000	Lacto-ovo	M 51-70	100%	136%	219%	138%	15%	57%	31%	112%	225%	99%
2000	Lacto-ovo	F19-30	100%	166%	219%	138%	15%	57%	31%	134%	100%	135%
2000	Vegan	M 51-70	101%	120%	220%	154%	13%	57%	33%	111%	282%	114%
2000	Vegan	F19-30	101%	146%	220%	154%	13%	57%	33%	134%	125%	155%
2200	Base	M 14-18	100%	192%	221%	112%	18%	52%	32%	99%	177%	96%
2200	Base	M 31-50	100%	178%	221%	112%	18%	52%	32%	129%	244%	94%
2200	Plant-based	M 14-18	99%	171%	237%	136%	16%	56%	30%	105%	187%	108%
2200	Plant-based	M 31-50	99%	159%	237%	136%	16%	56%	30%	136%	257%	106%
2200	Lacto-ovo	M 14-18	100%	160%	241%	143%	15%	57%	31%	108%	188%	114%
2200	Lacto-ovo	M 31-50	100%	149%	241%	143%	15%	57%	31%	141%	259%	111%
2200	Vegan	M 14-18	101%	142%	243%	158%	13%	57%	33%	108%	230%	129%
2200	Vegan	M 31-50	101%	132%	243%	158%	13%	57%	33%	140%	316%	126%
2400	Base	M 19-30	99%	189%	240%	109%	18%	52%	32%	132%	266%	104%
2400	Plant-based	M 19-30	100%	168%	257%	133%	16%	56%	31%	140%	280%	118%
2400	Lacto-ovo	M 19-30	100%	157%	262%	140%	15%	57%	32%	145%	283%	124%
2400	Vegan	M 19-30	101%	140%	264%	155%	13%	57%	33%	144%	340%	140%
2600	Base	M 19-30	99%	198%	264%	113%	17%	53%	32%	137%	297%	114%
2600	Plant-based	M 19-30	100%	177%	281%	135%	15%	56%	31%	145%	311%	128%
2600	Lacto-ovo	M 19-30	100%	166%	286%	142%	14%	57%	32%	150%	313%	134%
2600	Vegan	M 19-30	101%	149%	289%	155%	13%	57%	33%	149%	371%	150%
2800	Base	M 14-18	100%	226%	289%	113%	17%	54%	32%	109%	234%	120%
2800	Plant-based	M 14-18	100%	202%	308%	135%	15%	57%	30%	116%	245%	134%
2800	Lacto-ovo	M 14-18	100%	189%	313%	142%	14%	58%	31%	120%	247%	140%
2800	Vegan	M 14-18	101%	171%	316%	155%	13%	58%	32%	119%	289%	156%
3000	Base	M 19-30	99%	214%	304%	112%	16%	53%	33%	143%	331%	127%
3000	Plant-based	M 19-30	100%	191%	323%	133%	14%	56%	32%	152%	346%	142%
3000	Lacto-ovo	M 19-30	100%	180%	328%	139%	13%	57%	33%	157%	348%	148%
3000	Vegan	M 19-30	101%	163%	331%	151%	12%	57%	34%	156%	406%	165%
3200	Base	M 14-18	99%	230%	317%	106%	15%	52%	36%	110%	241%	124%
3200	Plant-based	M 14-18	99%	206%	336%	126%	13%	55%	34%	117%	252%	138%
3200	Lacto-ovo	M 14-18	100%	194%	341%	131%	13%	56%	35%	121%	253%	145%
3200	Vegan	M 14-18	100%	175%	344%	143%	11%	56%	36%	120%	296%	161%

<sup>1</sup>Goal for fiber is 14 grams per 1000 calories.

**Table C2. Comparison of Nutrients in Base and Vegetarian Food Intake Patterns to Goals—continued**

Calorie Level	Food Pattern	% of goal for:	Phos-	Potas-	Sodium	Zinc	Copper	Man-	Selenium	Vitamin		Vitamin	
			phorus	sium				ganese		A	E	D	C
			% RDA	% AI	% UL	% RDA	% RDA	% AI	% RDA	% RDA	% AI	% RDA	
1000	Base	M/F 1 to 3	193%	56%	59%	231%	191%	148%	247%	149%	67%	77%	388%
1000	Plant-based	M/F 1 to 3	193%	57%	56%	212%	205%	169%	226%	145%	68%	77%	391%
1000	Lacto-ovo	M/F 1 to 3	193%	57%	56%	206%	214%	182%	209%	145%	71%	72%	393%
1000	Vegan	M/F 1 to 3	131%	57%	41%	171%	309%	232%	192%	150%	83%	104%	392%
1200	Base	M/F 4 to 8	210%	54%	57%	176%	194%	156%	214%	132%	70%	83%	279%
1200	Plant-based	M/F 4 to 8	211%	56%	53%	158%	210%	182%	193%	128%	73%	83%	282%
1200	Lacto-ovo	M/F 4 to 8	211%	56%	54%	153%	220%	197%	176%	127%	76%	75%	283%
1200	Vegan	M/F 4 to 8	154%	56%	41%	132%	296%	239%	159%	129%	85%	106%	283%
1400	Base	M/F 4 to 8	239%	62%	67%	210%	231%	192%	262%	142%	77%	89%	356%
1400	Plant-based	M/F 4 to 8	239%	65%	61%	186%	252%	225%	234%	137%	80%	88%	359%
1400	Lacto-ovo	M/F 4 to 8	239%	65%	62%	179%	265%	246%	212%	136%	85%	78%	361%
1400	Vegan	M/F 4 to 8	182%	66%	48%	158%	344%	289%	189%	136%	94%	107%	361%
1600	Base	M/F 9 to 13	125%	66%	69%	166%	173%	210%	237%	126%	61%	125%	222%
1600	Base	F 51 to 70	223%	63%	66%	166%	135%	187%	172%	108%	45%	62%	133%
1600	Plant-based	M/F 9 to 13	125%	69%	64%	148%	190%	250%	210%	122%	64%	124%	225%
1600	Plant-based	F 51 to 70	224%	66%	61%	148%	148%	222%	153%	105%	47%	62%	135%
1600	Lacto-ovo	M/F 9 to 13	125%	69%	64%	142%	201%	274%	190%	121%	67%	112%	226%
1600	Lacto-ovo	F 51 to 70	224%	66%	61%	142%	156%	244%	138%	104%	49%	56%	136%
1600	Vegan	M/F 9 to 13	91%	69%	48%	123%	273%	333%	168%	123%	76%	157%	226%
1600	Vegan	F 51 to 70	162%	66%	46%	123%	213%	296%	123%	105%	56%	78%	136%
1800	Base	M/F 9 to 13	131%	73%	76%	173%	197%	193%	253%	137%	69%	126%	240%
1800	Base	F 14-18	131%	70%	72%	154%	155%	229%	184%	117%	50%	126%	166%
1800	Base	F 31-50	235%	70%	72%	173%	153%	203%	184%	117%	50%	126%	144%
1800	Plant-based	M/F 9 to 13	132%	75%	70%	155%	214%	226%	226%	132%	71%	125%	242%
1800	Plant-based	F 14-18	132%	72%	67%	138%	168%	268%	165%	113%	52%	125%	168%
1800	Plant-based	F 31-50	235%	72%	67%	155%	166%	238%	165%	113%	52%	125%	145%
1800	Lacto-ovo	M/F 9 to 13	132%	75%	70%	149%	224%	246%	206%	131%	75%	113%	243%
1800	Lacto-ovo	F 14-18	132%	72%	67%	133%	176%	293%	150%	113%	55%	113%	168%
1800	Lacto-ovo	F 31-50	235%	72%	67%	149%	174%	260%	150%	113%	55%	113%	146%
1800	Vegan	M/F 9 to 13	97%	76%	54%	130%	297%	296%	185%	133%	84%	158%	243%
1800	Vegan	F 14-18	97%	73%	52%	115%	233%	352%	134%	114%	62%	158%	168%
1800	Vegan	F 31-50	174%	73%	52%	130%	231%	313%	134%	114%	62%	158%	146%

**Table C2. Comparison of Nutrients in Base and Vegetarian Food Intake Patterns to Goals—continued**

Calorie Level	Food Pattern	% of goal for:	Phosphorus % RDA	Potassium % AI	Sodium % UL	Zinc % RDA	Copper % RDA	Manganese % AI	Selenium % RDA	Vitamin A % RDA	Vitamin E % RDA	Vitamin D % AI	Vitamin C % RDA
2000	Base	M 51-70	241%	74%	75%	130%	161%	164%	192%	95%	55%	64%	140%
2000	Base	F19-30	241%	74%	75%	179%	161%	210%	192%	122%	55%	129%	168%
2000	Plant-based	M 51-70	242%	77%	69%	116%	175%	194%	170%	91%	58%	64%	142%
2000	Plant-based	F19-30	242%	77%	69%	159%	175%	248%	170%	117%	58%	128%	170%
2000	Lacto-ovo	M 51-70	242%	77%	69%	111%	184%	213%	154%	91%	60%	57%	142%
2000	Lacto-ovo	F19-30	242%	77%	69%	153%	184%	272%	154%	117%	60%	115%	171%
2000	Vegan	M 51-70	181%	78%	53%	97%	241%	254%	137%	91%	67%	79%	142%
2000	Vegan	F19-30	181%	78%	53%	134%	241%	325%	137%	117%	67%	159%	170%
2200	Base	M 14-18	147%	82%	82%	144%	184%	199%	212%	103%	61%	133%	183%
2200	Base	M 31-50	262%	82%	82%	144%	182%	190%	212%	103%	61%	133%	153%
2200	Plant-based	M 14-18	147%	85%	75%	128%	200%	233%	189%	100%	63%	132%	185%
2200	Plant-based	M 31-50	263%	85%	75%	128%	198%	223%	189%	100%	63%	132%	154%
2200	Lacto-ovo	M 14-18	147%	85%	76%	124%	210%	255%	171%	99%	67%	118%	186%
2200	Lacto-ovo	M 31-50	263%	85%	76%	124%	207%	243%	171%	99%	67%	118%	155%
2200	Vegan	M 14-18	113%	86%	59%	109%	268%	298%	152%	99%	73%	161%	186%
2200	Vegan	M 31-50	201%	86%	59%	109%	265%	285%	152%	99%	73%	161%	155%
2400	Base	M 19-30	276%	84%	88%	155%	192%	208%	231%	108%	64%	137%	153%
2400	Plant-based	M 19-30	277%	87%	81%	138%	209%	244%	205%	104%	67%	136%	155%
2400	Lacto-ovo	M 19-30	277%	87%	82%	133%	220%	266%	186%	103%	70%	121%	156%
2400	Vegan	M 19-30	215%	88%	65%	118%	278%	309%	166%	103%	77%	164%	156%
2600	Base	M 19-30	292%	91%	94%	165%	211%	234%	243%	117%	71%	140%	166%
2600	Plant-based	M 19-30	293%	94%	86%	148%	228%	269%	218%	114%	73%	139%	167%
2600	Lacto-ovo	M 19-30	293%	94%	87%	143%	239%	291%	198%	113%	77%	123%	168%
2600	Vegan	M 19-30	231%	95%	71%	128%	297%	334%	179%	113%	84%	166%	168%
2800	Base	M 14-18	173%	97%	100%	177%	229%	268%	262%	122%	75%	144%	224%
2800	Plant-based	M 14-18	173%	100%	92%	158%	248%	308%	235%	118%	77%	142%	227%
2800	Lacto-ovo	M 14-18	173%	100%	93%	152%	259%	333%	214%	117%	81%	126%	227%
2800	Vegan	M 14-18	138%	101%	76%	138%	319%	378%	193%	116%	88%	168%	227%
3000	Base	M 19-30	315%	102%	101%	180%	237%	263%	264%	126%	84%	145%	195%
3000	Plant-based	M 19-30	315%	105%	94%	161%	256%	301%	237%	122%	86%	144%	197%
3000	Lacto-ovo	M 19-30	315%	105%	94%	155%	267%	325%	216%	121%	90%	127%	197%
3000	Vegan	M 19-30	254%	106%	77%	141%	326%	368%	194%	121%	97%	169%	197%
3200	Base	M 14-18	176%	102%	102%	180%	240%	275%	264%	129%	90%	146%	234%
3200	Plant-based	M 14-18	177%	105%	95%	161%	259%	315%	237%	125%	92%	145%	236%
3200	Lacto-ovo	M 14-18	177%	105%	95%	155%	270%	340%	216%	124%	96%	128%	237%
3200	Vegan	M 14-18	142%	106%	78%	141%	330%	385%	194%	123%	103%	170%	237%

**Table C2. Comparison of Nutrients in Base and Vegetarian Food Intake Patterns to Goals—continued**

Calorie Level	Food Pattern	% of goal for:	Thiamin % RDA	Riboflavin % RDA	Niacin % RDA	Vitamin B-6 % RDA	Vitamin B-12 % RDA	Choline % AI	Vitamin K % AI	Folate % RDA	Cholesterol % limit <sup>1</sup>
1000	Base	M/F 1 to 3	172%	239%	165%	213%	371%	78%	193%	197%	31%
1000	Plant-based	M/F 1 to 3	208%	233%	144%	202%	343%	69%	189%	226%	24%
1000	Lacto-ovo	M/F 1 to 3	244%	235%	137%	197%	304%	68%	187%	234%	23%
1000	Vegan	M/F 1 to 3	317%	267%	149%	213%	555%	75%	220%	250%	3%
1200	Base	M/F 4 to 8	186%	234%	172%	233%	335%	80%	162%	193%	43%
1200	Plant-based	M/F 4 to 8	232%	228%	149%	220%	304%	69%	161%	226%	32%
1200	Lacto-ovo	M/F 4 to 8	277%	230%	141%	213%	261%	68%	158%	235%	30%
1200	Vegan	M/F 4 to 8	334%	252%	150%	226%	441%	70%	174%	250%	3%
1400	Base	M/F 4 to 8	224%	269%	214%	280%	390%	95%	167%	234%	55%
1400	Plant-based	M/F 4 to 8	285%	260%	182%	263%	349%	81%	164%	277%	40%
1400	Lacto-ovo	M/F 4 to 8	345%	263%	172%	254%	292%	80%	162%	290%	38%
1400	Vegan	M/F 4 to 8	397%	281%	181%	267%	466%	77%	178%	305%	4%
1600	Base	M/F 9 to 13	171%	226%	165%	202%	341%	81%	209%	178%	69%
1600	Base	F 51 to 70	140%	185%	141%	134%	256%	72%	139%	134%	69%
1600	Plant-based	M/F 9 to 13	222%	219%	138%	188%	307%	70%	206%	214%	51%
1600	Plant-based	F 51 to 70	181%	179%	118%	126%	231%	61%	137%	161%	51%
1600	Lacto-ovo	M/F 9 to 13	271%	221%	129%	182%	259%	69%	203%	225%	48%
1600	Lacto-ovo	F 51 to 70	222%	181%	111%	121%	194%	60%	135%	169%	48%
1600	Vegan	M/F 9 to 13	327%	242%	139%	194%	438%	69%	226%	239%	4%
1600	Vegan	F 51 to 70	267%	198%	119%	129%	328%	61%	151%	180%	4%
1800	Base	M/F 9 to 13	193%	241%	181%	220%	347%	85%	223%	205%	69%
1800	Base	F 14-18	174%	217%	155%	183%	261%	80%	178%	154%	69%
1800	Base	F 31-50	158%	197%	155%	169%	261%	75%	149%	154%	69%
1800	Plant-based	M/F 9 to 13	244%	234%	155%	206%	313%	74%	220%	241%	51%
1800	Plant-based	F 14-18	220%	210%	133%	172%	235%	69%	176%	181%	51%
1800	Plant-based	F 31-50	200%	191%	133%	159%	235%	65%	146%	181%	51%
1800	Lacto-ovo	M/F 9 to 13	294%	236%	146%	200%	265%	73%	216%	251%	49%
1800	Lacto-ovo	F 14-18	265%	213%	125%	167%	199%	68%	173%	189%	49%
1800	Lacto-ovo	F 31-50	241%	193%	125%	154%	199%	64%	144%	189%	49%
1800	Vegan	M/F 9 to 13	349%	257%	156%	212%	444%	73%	239%	266%	4%
1800	Vegan	F 14-18	314%	231%	133%	176%	333%	68%	192%	200%	4%
1800	Vegan	F 31-50	286%	210%	133%	163%	333%	64%	160%	200%	4%

<sup>1</sup>Limit for cholesterol is less than 300 mg per day.

**Table C2. Comparison of Nutrients in Base and Vegetarian Food Intake Patterns to Goals—continued**

Calorie Level	Food Pattern	% of goal for:	Thiamin % RDA	Riboflavin % RDA	Niacin % RDA	Vitamin B-6 % RDA	Vitamin B-12 % RDA	Choline % AI	Vitamin K % AI	Folate % RDA	Cholesterol % limit <sup>1</sup>
2000	Base	M 51-70	150%	172%	143%	137%	272%	62%	117%	157%	76%
2000	Base	F19-30	164%	203%	163%	180%	272%	80%	156%	157%	76%
2000	Plant-based	M 51-70	192%	167%	121%	129%	244%	53%	115%	187%	57%
2000	Plant-based	F19-30	210%	197%	138%	168%	244%	69%	154%	187%	57%
2000	Lacto-ovo	M 51-70	233%	169%	114%	125%	204%	52%	113%	196%	53%
2000	Lacto-ovo	F19-30	254%	199%	130%	163%	204%	68%	151%	196%	53%
2000	Vegan	M 51-70	274%	182%	121%	131%	336%	51%	125%	207%	6%
2000	Vegan	F19-30	298%	215%	138%	172%	336%	66%	166%	207%	6%
2200	Base	M 14-18	170%	186%	161%	201%	290%	68%	234%	184%	83%
2200	Base	M 31-50	170%	186%	161%	201%	290%	68%	146%	184%	83%
2200	Plant-based	M 14-18	216%	180%	137%	189%	259%	58%	230%	216%	61%
2200	Plant-based	M 31-50	216%	180%	137%	189%	259%	58%	144%	216%	61%
2200	Lacto-ovo	M 14-18	261%	182%	129%	183%	216%	57%	228%	226%	57%
2200	Lacto-ovo	M 31-50	261%	182%	129%	183%	216%	57%	142%	226%	57%
2200	Vegan	M 14-18	300%	195%	137%	192%	347%	55%	247%	238%	6%
2200	Vegan	M 31-50	300%	195%	137%	192%	347%	55%	154%	238%	6%
2400	Base	M 19-30	184%	197%	175%	213%	308%	71%	150%	201%	89%
2400	Plant-based	M 19-30	234%	190%	149%	200%	275%	61%	148%	236%	66%
2400	Lacto-ovo	M 19-30	282%	193%	141%	194%	228%	60%	146%	246%	62%
2400	Vegan	M 19-30	321%	204%	148%	203%	357%	57%	157%	259%	8%
2600	Base	M 19-30	202%	208%	188%	231%	317%	74%	176%	226%	90%
2600	Plant-based	M 19-30	252%	202%	162%	218%	283%	64%	174%	262%	67%
2600	Lacto-ovo	M 19-30	300%	204%	154%	211%	236%	63%	172%	272%	63%
2600	Vegan	M 19-30	339%	216%	162%	220%	365%	61%	184%	284%	8%
2800	Base	M 14-18	219%	221%	204%	249%	335%	79%	288%	246%	97%
2800	Plant-based	M 14-18	272%	214%	176%	235%	299%	68%	284%	284%	71%
2800	Lacto-ovo	M 14-18	324%	217%	167%	228%	248%	67%	280%	295%	67%
2800	Vegan	M 14-18	362%	227%	175%	237%	376%	63%	299%	308%	9%
3000	Base	M 19-30	225%	224%	208%	259%	337%	81%	194%	254%	97%
3000	Plant-based	M 19-30	279%	217%	180%	245%	301%	70%	192%	292%	72%
3000	Lacto-ovo	M 19-30	331%	220%	171%	238%	251%	69%	190%	303%	68%
3000	Vegan	M 19-30	368%	230%	179%	247%	378%	65%	201%	316%	10%
3200	Base	M 14-18	225%	224%	208%	261%	340%	81%	324%	254%	99%
3200	Plant-based	M 14-18	279%	217%	180%	247%	304%	70%	320%	292%	74%
3200	Lacto-ovo	M 14-18	331%	220%	171%	240%	253%	69%	316%	303%	70%
3200	Vegan	M 14-18	368%	230%	179%	249%	380%	65%	335%	316%	12%

<sup>1</sup>Limit for cholesterol is less than 300 mg per day.

**Table C2. Comparison of Nutrients in Base and Vegetarian Food Intake Patterns to Goals—continued**

<b>Calorie Level</b>	<b>Food Pattern</b>	<b>% of goal for:</b>	<b>Saturated fatty acids % of kcal</b>	<b>Mono-unsaturated fatty acids % of kcal</b>	<b>Poly-unsaturated fatty acids % of kcal</b>	<b>18:2 Linoleic % AI</b>	<b>18:3 Linolenic %AI</b>
1000	Base	M/F 1 to 3	9%	12%	10%	140%	140%
1000	Plant-based	M/F 1 to 3	8%	11%	10%	137%	133%
1000	Lacto-ovo	M/F 1 to 3	8%	12%	10%	142%	130%
1000	Vegan	M/F 1 to 3	7%	13%	14%	182%	177%
1200	Base	M/F 4 to 8	8%	12%	10%	115%	126%
1200	Plant-based	M/F 4 to 8	8%	11%	10%	115%	123%
1200	Lacto-ovo	M/F 4 to 8	8%	12%	10%	119%	116%
1200	Vegan	M/F 4 to 8	7%	13%	13%	143%	149%
1400	Base	M/F 4 to 8	8%	11%	9%	123%	132%
1400	Plant-based	M/F 4 to 8	7%	11%	9%	122%	126%
1400	Lacto-ovo	M/F 4 to 8	7%	11%	9%	130%	121%
1400	Vegan	M/F 4 to 8	6%	12%	11%	155%	154%
1600	Base	M/F 9 to 13	8%	11%	9%	147%	145%
1600	Base	F 51 to 70	8%	11%	9%	133%	132%
1600	Plant-based	M/F 9 to 13	7%	11%	9%	146%	139%
1600	Plant-based	F 51 to 70	7%	11%	9%	133%	127%
1600	Lacto-ovo	M/F 9 to 13	7%	12%	9%	153%	131%
1600	Lacto-ovo	F 51 to 70	7%	12%	9%	139%	119%
1600	Vegan	M/F 9 to 13	6%	12%	13%	192%	177%
1600	Vegan	F 51 to 70	6%	12%	13%	175%	161%
1800	Base	M/F 9 to 13	8%	11%	9%	136%	135%
1800	Base	F 14-18	8%	11%	9%	149%	148%
1800	Base	F 31-50	8%	11%	9%	136%	148%
1800	Plant-based	M/F 9 to 13	7%	11%	9%	135%	129%
1800	Plant-based	F 14-18	7%	11%	9%	147%	141%
1800	Plant-based	F 31-50	7%	11%	9%	135%	141%
1800	Lacto-ovo	M/F 9 to 13	7%	11%	9%	141%	122%
1800	Lacto-ovo	F 14-18	7%	11%	9%	153%	134%
1800	Lacto-ovo	F 31-50	7%	11%	9%	141%	134%
1800	Vegan	M/F 9 to 13	6%	12%	12%	173%	161%
1800	Vegan	F 14-18	6%	12%	12%	189%	176%
1800	Vegan	F 31-50	6%	12%	12%	173%	176%

**Table C2. Comparison of Nutrients in Base and Vegetarian Food Intake Patterns to Goals—continued**

<b>Calorie Level</b>	<b>Food Pattern</b>	<b>% of goal for:</b>	<b>Saturated fatty acids % of kcal</b>	<b>Monounsaturated fatty acids % of kcal</b>	<b>Polyunsaturated fatty acids % of kcal</b>	<b>18:2 Linoleic % AI</b>	<b>18:3 Linolenic %AI</b>
2000	Base	M 51-70	8%	12%	9%	134%	116%
2000	Base	F19-30	8%	12%	9%	156%	168%
2000	Plant-based	M 51-70	8%	11%	9%	133%	112%
2000	Plant-based	F19-30	8%	11%	9%	156%	163%
2000	Lacto-ovo	M 51-70	8%	12%	9%	137%	104%
2000	Lacto-ovo	F19-30	8%	12%	9%	160%	152%
2000	Vegan	M 51-70	7%	12%	12%	165%	133%
2000	Vegan	F19-30	7%	12%	12%	193%	194%
2200	Base	M 14-18	8%	12%	9%	128%	127%
2200	Base	M 31-50	8%	12%	9%	120%	127%
2200	Plant-based	M 14-18	8%	11%	9%	126%	121%
2200	Plant-based	M 31-50	8%	11%	9%	118%	121%
2200	Lacto-ovo	M 14-18	8%	12%	9%	132%	116%
2200	Lacto-ovo	M 31-50	8%	12%	9%	125%	116%
2200	Vegan	M 14-18	7%	12%	12%	157%	145%
2200	Vegan	M 31-50	7%	12%	12%	148%	145%
2400	Base	M 19-30	8%	12%	9%	132%	137%
2400	Plant-based	M 19-30	8%	12%	9%	132%	133%
2400	Lacto-ovo	M 19-30	8%	12%	10%	137%	126%
2400	Vegan	M 19-30	7%	13%	12%	160%	155%
2600	Base	M 19-30	8%	12%	9%	144%	151%
2600	Plant-based	M 19-30	8%	11%	9%	144%	146%
2600	Lacto-ovo	M 19-30	8%	12%	10%	149%	139%
2600	Vegan	M 19-30	7%	12%	12%	172%	169%
2800	Base	M 14-18	8%	12%	9%	164%	161%
2800	Plant-based	M 14-18	8%	11%	9%	161%	153%
2800	Lacto-ovo	M 14-18	8%	12%	9%	168%	147%
2800	Vegan	M 14-18	7%	12%	11%	193%	176%
3000	Base	M 19-30	9%	12%	10%	177%	188%
3000	Plant-based	M 19-30	8%	12%	10%	176%	181%
3000	Lacto-ovo	M 19-30	8%	12%	10%	182%	174%
3000	Vegan	M 19-30	7%	13%	12%	205%	204%
3200	Base	M 14-18	9%	13%	11%	188%	188%
3200	Plant-based	M 14-18	9%	13%	11%	187%	181%
3200	Lacto-ovo	M 14-18	9%	13%	11%	194%	174%
3200	Vegan	M 14-18	8%	13%	12%	218%	204%

**Table D1. Summary of Amino Acids in Base and Vegetarian Food Intake Patterns**

<b>Calorie Level</b>	<b>Food Pattern</b>	<b>Cystine g</b>	<b>Histidine g</b>	<b>Isoleucine g</b>	<b>Leucine g</b>	<b>Lysine g</b>	<b>Methionine g</b>	<b>Phenylalanine g</b>
1000	Base	0.69	0.88	1.45	2.70	2.20	0.69	1.47
1000	Plant-based	0.65	0.74	1.28	2.46	1.81	0.55	1.40
1000	Lacto-ovo	0.63	0.68	1.19	2.32	1.57	0.48	1.36
1000	Vegan	0.33	0.65	1.07	1.93	1.26	0.36	1.27
1200	Base	0.85	1.16	1.91	3.49	2.88	0.93	1.92
1200	Plant-based	0.78	0.96	1.65	3.12	2.31	0.72	1.81
1200	Lacto-ovo	0.76	0.87	1.51	2.92	1.94	0.61	1.76
1200	Vegan	0.45	0.83	1.37	2.50	1.60	0.48	1.65
1400	Base	1.00	1.44	2.33	4.22	3.53	1.15	2.33
1400	Plant-based	0.91	1.17	1.98	3.73	2.76	0.87	2.19
1400	Lacto-ovo	0.88	1.05	1.80	3.46	2.28	0.72	2.12
1400	Vegan	0.55	1.00	1.64	3.01	1.91	0.58	1.99
1600	Base	1.27	1.81	2.94	5.33	4.55	1.44	2.91
1600	Plant-based	1.16	1.47	2.50	4.72	3.59	1.10	2.73
1600	Lacto-ovo	1.12	1.31	2.27	4.38	2.98	0.91	2.64
1600	Vegan	0.65	1.25	2.06	3.74	2.46	0.70	2.47
1800	Base	1.34	1.90	3.10	5.64	4.72	1.51	3.12
1800	Plant-based	1.22	1.57	2.67	5.02	3.76	1.16	2.94
1800	Lacto-ovo	1.19	1.41	2.44	4.69	3.16	0.97	2.85
1800	Vegan	0.72	1.35	2.22	4.04	2.63	0.76	2.68
2000	Base	1.39	2.02	3.27	5.92	5.02	1.60	3.27
2000	Plant-based	1.26	1.65	2.79	5.24	3.96	1.22	3.07
2000	Lacto-ovo	1.22	1.47	2.54	4.87	3.30	1.01	2.97
2000	Vegan	0.74	1.41	2.31	4.21	2.76	0.79	2.80
2200	Base	1.51	2.23	3.61	6.52	5.50	1.76	3.64
2200	Plant-based	1.37	1.83	3.09	5.78	4.35	1.34	3.42
2200	Lacto-ovo	1.33	1.64	2.81	5.38	3.62	1.11	3.31
2200	Vegan	0.85	1.57	2.58	4.70	3.07	0.89	3.13
2400	Base	1.61	2.39	3.87	6.98	5.85	1.89	3.90
2400	Plant-based	1.46	1.95	3.30	6.18	4.61	1.44	3.66
2400	Lacto-ovo	1.42	1.75	3.00	5.75	3.82	1.19	3.55
2400	Vegan	0.93	1.68	2.75	5.05	3.26	0.96	3.36
2600	Base	1.69	2.50	4.05	7.32	6.06	1.96	4.13
2600	Plant-based	1.54	2.06	3.49	6.53	4.81	1.51	3.89
2600	Lacto-ovo	1.49	1.86	3.19	6.09	4.03	1.26	3.78
2600	Vegan	1.01	1.79	2.94	5.40	3.46	1.03	3.59
2800	Base	1.79	2.67	4.32	7.80	6.44	2.10	4.41
2800	Plant-based	1.63	2.20	3.71	6.94	5.09	1.61	4.15
2800	Lacto-ovo	1.58	1.98	3.38	6.47	4.25	1.35	4.03
2800	Vegan	1.09	1.91	3.12	5.76	3.67	1.11	3.83
3000	Base	1.82	2.72	4.40	7.94	6.55	2.12	4.51
3000	Plant-based	1.65	2.25	3.79	7.08	5.21	1.64	4.25
3000	Lacto-ovo	1.61	2.03	3.47	6.61	4.37	1.37	4.13
3000	Vegan	1.11	1.95	3.20	5.90	3.79	1.13	3.93
3200	Base	1.82	2.72	4.40	7.94	6.56	2.12	4.51
3200	Plant-based	1.65	2.25	3.79	7.08	5.21	1.64	4.25
3200	Lacto-ovo	1.61	2.03	3.47	6.61	4.37	1.37	4.13
3200	Vegan	1.11	1.95	3.21	5.90	3.79	1.13	3.93



**Table D1. Summary of Amino Acids in Base and Vegetarian Food Intake Patterns—continued**

Calorie Level	Food Pattern	Threonine	Tyrosine	Tryptophan	Valine	Methionine + Cystine	Phenylalanine + Tyrosine
		g	g	g	g	g	g
1000	Base	1.16	1.14	0.37	1.67	1.38	2.61
1000	Plant-based	1.00	1.02	0.35	1.52	1.20	2.42
1000	Lacto-ovo	0.91	0.98	0.33	1.43	1.11	2.34
1000	Vegan	0.94	0.80	0.33	1.25	0.70	2.07
1200	Base	1.56	1.46	0.49	2.18	1.78	3.39
1200	Plant-based	1.32	1.30	0.45	1.95	1.50	3.10
1200	Lacto-ovo	1.19	1.23	0.42	1.82	1.36	2.99
1200	Vegan	1.20	1.03	0.41	1.61	0.92	2.68
1400	Base	1.93	1.77	0.59	2.65	2.15	4.10
1400	Plant-based	1.62	1.54	0.54	2.34	1.78	3.73
1400	Lacto-ovo	1.44	1.46	0.50	2.17	1.60	3.57
1400	Vegan	1.43	1.23	0.49	1.94	1.13	3.23
1600	Base	2.41	2.25	0.74	3.34	2.71	5.16
1600	Plant-based	2.02	1.97	0.68	2.95	2.25	4.70
1600	Lacto-ovo	1.80	1.86	0.63	2.74	2.03	4.50
1600	Vegan	1.81	1.55	0.61	2.41	1.35	4.02
1800	Base	2.56	2.36	0.78	3.53	2.84	5.48
1800	Plant-based	2.16	2.07	0.72	3.15	2.38	5.01
1800	Lacto-ovo	1.94	1.97	0.68	2.94	2.16	4.81
1800	Vegan	1.95	1.65	0.66	2.61	1.48	4.33
2000	Base	2.71	2.48	0.82	3.71	2.98	5.75
2000	Plant-based	2.27	2.17	0.75	3.29	2.48	5.24
2000	Lacto-ovo	2.03	2.05	0.71	3.06	2.23	5.02
2000	Vegan	2.03	1.72	0.69	2.72	1.54	4.52
2200	Base	3.01	2.72	0.91	4.11	3.27	6.36
2200	Plant-based	2.53	2.38	0.84	3.65	2.71	5.80
2200	Lacto-ovo	2.27	2.25	0.79	3.39	2.44	5.56
2200	Vegan	2.26	1.91	0.76	3.04	1.74	5.04
2400	Base	3.23	2.90	0.98	4.40	3.50	6.81
2400	Plant-based	2.71	2.53	0.90	3.90	2.90	6.20
2400	Lacto-ovo	2.43	2.39	0.84	3.62	2.61	5.94
2400	Vegan	2.41	2.05	0.82	3.26	1.89	5.41
2600	Base	3.39	3.03	1.03	4.62	3.65	7.16
2600	Plant-based	2.88	2.66	0.95	4.12	3.05	6.55
2600	Lacto-ovo	2.59	2.52	0.90	3.85	2.76	6.30
2600	Vegan	2.57	2.18	0.87	3.49	2.04	5.76
2800	Base	3.62	3.22	1.10	4.93	3.89	7.63
2800	Plant-based	3.07	2.82	1.02	4.39	3.24	6.97
2800	Lacto-ovo	2.76	2.67	0.95	4.09	2.93	6.70
2800	Vegan	2.73	2.32	0.93	3.72	2.20	6.15
3000	Base	3.70	3.27	1.13	5.02	3.94	7.78
3000	Plant-based	3.14	2.87	1.04	4.49	3.29	7.12
3000	Lacto-ovo	2.84	2.72	0.98	4.19	2.98	6.85
3000	Vegan	2.80	2.37	0.95	3.82	2.24	6.30
3200	Base	3.70	3.27	1.13	5.03	3.94	7.78
3200	Plant-based	3.14	2.87	1.04	4.49	3.29	7.12
3200	Lacto-ovo	2.84	2.72	0.98	4.19	2.98	6.85
3200	Vegan	2.80	2.37	0.95	3.82	2.24	6.30

**Table D2. Comparison of Amino Acids in Base and Vegetarian Food Intake Patterns to Goals<sup>1</sup>**

Calorie Level	Food Pattern	% of goal for:	Histidine % RDA	Isoleucine % RDA	Leucine % RDA	Lysine % RDA	Threonine % RDA	Tryptophan % RDA	Valine % RDA	Methionine + Cystine % RDA <sup>2</sup>	Phenylalanine + Tyrosine % RDA <sup>2</sup>
1000	Base	M/F 1 to 3	348%	432%	358%	315%	302%	390%	376%	412%	403%
1000	Plant-based	M/F 1 to 3	294%	380%	325%	260%	261%	364%	342%	357%	374%
1000	Lacto-ovo	M/F 1 to 3	269%	353%	307%	226%	238%	346%	323%	330%	362%
1000	Vegan	M/F 1 to 3	256%	318%	256%	181%	246%	339%	280%	207%	319%
1200	Base	M/F 4 to 8	364%	433%	356%	313%	325%	405%	389%	404%	413%
1200	Plant-based	M/F 4 to 8	301%	374%	318%	251%	276%	374%	348%	341%	379%
1200	Lacto-ovo	M/F 4 to 8	271%	343%	298%	211%	248%	352%	325%	310%	364%
1200	Vegan	M/F 4 to 8	259%	311%	255%	174%	251%	344%	287%	210%	326%
1400	Base	M/F 4 to 8	451%	530%	431%	384%	403%	491%	473%	488%	500%
1400	Plant-based	M/F 4 to 8	366%	450%	381%	300%	337%	450%	418%	404%	455%
1400	Lacto-ovo	M/F 4 to 8	327%	409%	353%	248%	300%	420%	388%	364%	436%
1400	Vegan	M/F 4 to 8	313%	372%	307%	208%	299%	409%	346%	257%	394%
1600	Base	M/F 9 to 13	325%	378%	307%	286%	296%	332%	334%	349%	367%
1600	Base	F 51 to 70	226%	271%	223%	210%	212%	259%	244%	251%	275%
1600	Plant-based	M/F 9 to 13	265%	322%	271%	225%	248%	304%	296%	290%	334%
1600	Plant-based	F 51 to 70	184%	231%	197%	166%	177%	237%	216%	208%	250%
1600	Lacto-ovo	M/F 9 to 13	236%	293%	252%	188%	221%	284%	275%	261%	320%
1600	Lacto-ovo	F 51 to 70	164%	210%	183%	138%	158%	222%	200%	187%	239%
1600	Vegan	M/F 9 to 13	225%	265%	215%	155%	222%	277%	242%	174%	286%
1600	Vegan	F 51 to 70	156%	190%	156%	114%	158%	216%	176%	125%	214%
1800	Base	M/F 9 to 13	311%	392%	320%	285%	296%	363%	350%	359%	371%
1800	Base	F 14-18	252%	302%	237%	219%	225%	291%	272%	277%	290%
1800	Base	F 31-50	238%	287%	235%	218%	224%	275%	258%	263%	291%
1800	Plant-based	M/F 9 to 13	256%	337%	285%	227%	250%	335%	312%	301%	339%
1800	Plant-based	F 14-18	207%	260%	211%	174%	191%	268%	243%	232%	265%
1800	Plant-based	F 31-50	196%	246%	210%	174%	190%	254%	230%	220%	266%
1800	Lacto-ovo	M/F 9 to 13	230%	308%	266%	191%	225%	315%	291%	272%	326%
1800	Lacto-ovo	F 14-18	186%	237%	197%	146%	171%	252%	227%	210%	255%
1800	Lacto-ovo	F 31-50	176%	225%	196%	146%	170%	238%	215%	199%	256%
1800	Vegan	M/F 9 to 13	220%	280%	229%	159%	226%	307%	259%	187%	294%
1800	Vegan	F 14-18	178%	216%	170%	122%	172%	245%	201%	144%	229%
1800	Vegan	F 31-50	169%	205%	169%	122%	171%	232%	191%	137%	230%

<sup>1</sup>The RDAs for amino acids by life stage and gender group are expressed as grams per kilogram per day. To determine how the amount of each essential amino acid in a pattern compared to the RDA, the RDA was multiplied by a reference weight (kg) for the age/sex group from the CDC/NCHS Growth Charts and used in the DRI reports. (IOM, 2006)

<sup>2</sup>For Methionine + Cystine and Phenylalanine + Tyrosine, RDAs are expressed for the total of the two individual amino acids. Amounts were therefore summed and the total compared to the recommendation.

**Table D2. Comparison of Amino Acids in Base and Vegetarian Food Intake Patterns to Goals—continued<sup>1</sup>**

Calorie Level	Food Pattern	% of goal for:	Histidine % RDA	Isoleucine % RDA	Leucine % RDA	Lysine % RDA	Threonine % RDA	Tryptophan % RDA	Valine % RDA	Methionine + Cystine % RDA <sup>2</sup>	Phenylalanine + Tyrosine % RDA <sup>2</sup>
2000	Base	M 51-70	206%	246%	201%	189%	193%	235%	221%	224%	249%
2000	Base	F19-30	253%	302%	247%	232%	238%	288%	271%	275%	306%
2000	Plant-based	M 51-70	168%	210%	178%	149%	162%	216%	196%	186%	227%
2000	Plant-based	F19-30	206%	258%	219%	183%	199%	265%	241%	229%	278%
2000	Lacto-ovo	M 51-70	150%	191%	166%	124%	145%	202%	182%	168%	217%
2000	Lacto-ovo	F19-30	185%	234%	204%	152%	178%	248%	224%	206%	267%
2000	Vegan	M 51-70	144%	174%	143%	104%	145%	196%	162%	116%	196%
2000	Vegan	F19-30	176%	213%	176%	127%	178%	241%	199%	142%	240%
2200	Base	M 14-18	244%	282%	228%	210%	224%	249%	249%	255%	274%
2200	Base	M 31-50	228%	272%	222%	207%	215%	261%	245%	246%	275%
2200	Plant-based	M 14-18	200%	241%	202%	166%	189%	229%	221%	212%	250%
2200	Plant-based	M 31-50	186%	232%	197%	163%	181%	240%	217%	204%	251%
2200	Lacto-ovo	M 14-18	179%	220%	188%	138%	169%	215%	206%	191%	240%
2200	Lacto-ovo	M 31-50	167%	212%	183%	136%	162%	224%	202%	184%	241%
2200	Vegan	M 14-18	171%	201%	164%	117%	168%	209%	185%	136%	218%
2200	Vegan	M 31-50	160%	194%	160%	115%	161%	218%	181%	131%	218%
2400	Base	M 19-30	244%	291%	237%	220%	231%	279%	262%	263%	295%
2400	Plant-based	M 19-30	199%	248%	210%	173%	194%	257%	232%	218%	268%
2400	Lacto-ovo	M 19-30	178%	226%	195%	144%	174%	240%	216%	196%	257%
2400	Vegan	M 19-30	171%	207%	172%	122%	172%	234%	194%	142%	234%
2600	Base	M 19-30	255%	305%	249%	228%	242%	295%	275%	274%	310%
2600	Plant-based	M 19-30	211%	262%	222%	181%	205%	272%	245%	229%	284%
2600	Lacto-ovo	M 19-30	189%	240%	207%	152%	185%	256%	229%	207%	273%
2600	Vegan	M 19-30	182%	221%	184%	130%	184%	250%	208%	153%	250%
2800	Base	M 14-18	292%	337%	272%	245%	270%	301%	299%	304%	329%
2800	Plant-based	M 14-18	241%	289%	242%	194%	229%	278%	266%	253%	301%
2800	Lacto-ovo	M 14-18	216%	264%	226%	162%	206%	261%	249%	229%	289%
2800	Vegan	M 14-18	208%	244%	201%	140%	203%	254%	226%	171%	265%
3000	Base	M 19-30	278%	331%	270%	246%	264%	322%	299%	296%	337%
3000	Plant-based	M 19-30	230%	285%	241%	196%	224%	297%	267%	247%	308%
3000	Lacto-ovo	M 19-30	207%	261%	225%	164%	203%	279%	250%	224%	296%
3000	Vegan	M 19-30	199%	241%	201%	142%	200%	272%	227%	169%	273%
3200	Base	M 14-18	297%	343%	277%	250%	275%	308%	305%	307%	336%
3200	Plant-based	M 14-18	246%	296%	247%	199%	234%	284%	272%	257%	307%
3200	Lacto-ovo	M 14-18	222%	271%	231%	167%	211%	267%	255%	232%	295%
3200	Vegan	M 14-18	213%	250%	206%	144%	209%	260%	232%	175%	272%

<sup>1</sup>The RDAs for amino acids by life stage and gender group are expressed as grams per kilogram per day. To determine how the amount of each essential amino acid in a pattern compared to the RDA, the RDA was multiplied by a reference weight (kg) for the age/sex group from the CDC/NCHS Growth Charts and used in the DRI reports. (IOM, 2006)

<sup>2</sup>For Methionine + Cystine and Phenylalanine + Tyrosine, RDAs are expressed for the total of the two individual amino acids. Amounts were therefore summed and the total compared to the recommendation.