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Nutrition Research 31 (2011) 776–783

Nutrition Research

www.nrjournal.com

Fresh and fresh lean pork are substantial sources of key nutrients when these products are consumed by adults in the United States

Mary M. Murphy, Judith H. Spungen, Xiaoyu Bi, Leila M. Barraj *

E^xponent, Inc, Center for Chemical Regulation and Food Safety, Washington, DC 20036, USA

Received 1 July 2011; revised 12 September 2011; accepted 14 September 2011

Abstract

Many fresh pork products, in particular, fresh lean pork products, are nutrient-dense sources of protein and several other nutrients. The purpose of this study was to estimate nutritional contributions of fresh and fresh lean pork to adults' diets in the United States. Mean total nutrient intakes by fresh and fresh lean pork consumers on a day of recall were compared with intakes by nonconsumers to test the hypothesis that overall nutrient intakes by consumers were comparable with or better as compared with intakes by nonconsumers. Intakes were assessed using the National Health and Nutrition Examination Survey 2003 to 2006. Based on 1 day of dietary intake, 10% of adults consumed fresh pork, and 4% consumed fresh lean pork. Among consumers, fresh and fresh lean pork contributed 16% and 9%, respectively, of total fat and accounted for 23% to 31% of total protein, cholesterol, selenium, and thiamin intake. Fresh and fresh lean pork also accounted for 11% to 19% of total saturated fat, phosphorus, potassium, riboflavin, niacin, vitamin B_6, and vitamin B_{12} in the diets of consumers and contributed 21% and 16%, respectively, of total zinc. Diets including fresh or fresh lean pork provided higher energy-adjusted amounts of protein, selenium, thiamin, and vitamin B_6 as compared with diets of adults not consuming fresh pork ($P < .05$) and provided comparable amounts of fat and saturated fat. Consumption of lean cuts of fresh pork is consistent with dietary guidance, and selection of fresh lean pork products by current nonconsumers could increase dietary variety without adversely affecting nutrient intake.

Keywords: Fresh pork; Lean pork; Meat; Nutrient intake; Adults; NHANES

Abbreviations: FNDDS, Food and Nutrient Database for Dietary Studies; NHANES, National Health and Nutrition Examination Survey; RDA, Recommended Dietary Allowance; USDA, United States Department of Agriculture.

1. Introduction

Dietary guidance for Americans includes recommendations to consume foods across a variety of food groups to meet nutrient needs [1]. Foods in the protein foods group, which includes seafood, meat, poultry, eggs, beans, peas, soy products, nuts, and seeds, are important dietary sources of protein as well as B vitamins, vitamin E, iron, zinc, and magnesium [1]. When consuming meat products, Americans are specifically encouraged to select lean or low-fat meat and poultry [1].

Pork ranks first in global per capita meat consumption [2]. In the United States, however, pork ranks third as a source of meat, following beef and chicken, based on per capita loss-adjusted food availability data [3].

Changes in animal husbandry practices and procedures that have been implemented in the pork industry over the last 2 decades have resulted in increased availability of leaner cuts of fresh pork [4]. In 2005, nutrient composition of 9 high-market-share fresh pork products was determined as part of a collaboration of the US Department of Agriculture

* Corresponding author. Tel.: +1 202 772 4909; fax: +1 202 772 4979.
E-mail address: lbarraj@exponent.com (L.M. Barraj).

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doi:10.1016/j.nutres.2011.09.006

(USDA) Nutrient Data Laboratory, scientists at the University of Wisconsin and the National Pork Board [4,5]. A comparison of the results of these analyses with older composition data for similar products indicated that the fat content of 8 of the 9 analyzed products had decreased significantly since 1991 [4].

Lean meats such as fresh lean pork are nutrient-dense sources of protein and several other nutrients. A 3-oz serving (85 g) of roasted pork tenderloin, for example, provides 22 g of protein, approximately 3 g of total fat, 1 g of saturated fat, and 62 mg of cholesterol while also providing an excellent source (≥20% of the daily value) of selenium, thiamin, niacin, vitamin B_6, and phosphorus and a good source (10% to 19% of the daily value) of riboflavin, zinc, and potassium [6,7]. Meats not meeting requirements for a "lean" designation on the product label may also contain substantial amounts of protein and other nutrients but, by definition, contain higher levels of fat, saturated fat, or cholesterol [8].

There is relatively limited information available on fresh pork consumption in the United States [9,10], and we are unaware of estimates specifically of fresh lean pork intake. Based on food consumption data collected by the USDA between 1994 and 1996, during 2 days of dietary recall, an estimated 13% to 16% of adult subpopulations aged 20 years and older consumed fresh cuts of pork including chops, steaks, or roasts, with mean intakes per occasion in the range of 62 to 117 g [10]. Davis and Lin [9] estimated the per capita intake of fresh pork to be approximately 24 g/d based on total pork disappearance data and consumption patterns from the USDA. In addition, men were found to be more likely to consume fresh pork than women, and fresh pork consumption was found to vary by race/ethnicity [9].

On a per capita basis, data from the 1994 to 1996 Continuing Survey of Food Intakes by Individuals showed that, among adults, fresh pork accounted for 4.1% of total thiamin intake, 3% each of protein and selenium, 2.8% of cholesterol, 2.2% of zinc, and between 1% and 2% of energy, total fat, saturated fat, riboflavin, niacin, vitamin B_6, vitamin B_{12}, phosphorus, and potassium [11]. The available nutrient intake data were based on older nutrition composition data and do not reflect the nutrient profiles of fresh pork cuts now available.

Given that fresh pork products and, particularly, fresh lean pork products are nutrient-dense sources of protein and several other nutrients, fresh and fresh lean pork are likely significant sources of protein in the diets of consumers. The purpose of this study was to estimate nutritional contributions of fresh pork and fresh lean pork (ie, fresh pork meeting criteria for the designation of "lean" on product labels) to adults' diets in the United States using current nutrient composition data on both a per capita basis and among consumers of these pork products on a day of consumption. Mean total nutrient intakes by fresh and fresh lean pork consumers on a day of recall were compared with intakes by nonconsumers to test the hypothesis that overall nutrient intakes by consumers were comparable with or better as compared with intakes by nonconsumers who are presumably consuming other foods from the protein foods group.

2. Methods and materials

2.1. Study population

Data from 9490 adult participants aged 19 years and older in the National Health and Nutrition Examination Survey (NHANES) 2003 to 2004 and 2005 to 2006, excluding pregnant and lactating women, were combined for these analyses. This continuous survey is based on a complex multistage probability sample designed to provide nationally representative nutrition and health data and prevalence estimates for nutrition and health status measures in the United States [12,13]. Approval for the NHANES data collection was provided by the National Center for Health Statistics Research Ethics Review Board. Demographic information such as age, sex, race/ethnicity, education, and household income were collected from each participant during the examination.

2.2. Food consumption data

Food consumption records collected as part of the NHANES 2003 to 2004 and 2005 to 2006 were used to estimate intakes of pork and all foods in the diet. As part of the NHANES examination, trained dietary interviewers collected detailed information on all foods and beverages consumed by respondents in the previous 24-hour period (midnight to midnight). A second dietary recall was administered by telephone 3 to 10 days after the first dietary interview but not on the same day of the week as the first interview. The current analysis was based on the day 1 dietary recalls.

2.3. Nutrient composition data

For each food reported in NHANES, the USDA Food and Nutrient Database for Dietary Studies (FNDDS) databases provide information on the amount of energy and approximately 60 nutrients or food constituents per 100 g of each food [14]. The FNDDS 3 was based on nutrient values in the USDA National Nutrient Database for Standard Reference, Release 20 [15] and was used by the USDA to process dietary recall data reported in NHANES 2005 to 2006 [14]. This version of FNDDS includes updated nutrient values for fresh pork products derived as part of a collaboration of the USDA Nutrient Data Laboratory, scientists at the University of Wisconsin, and the National Pork Board [5]. In this analysis, nutrient data in FNDDS 3 were used to calculate nutrient intakes for all foods reported by respondents in the combined NHANES 2003 to 2006. The FNDDS 2 was the source of nutrient data for foods reported only in NHANES 2003 to 2004 [16].

2.4. Identification of fresh and lean pork

The NHANES 2003 to 2006 respondents reported consumption of approximately 5000 specific foods; each food is identified by the USDA by a unique 8-digit food code. The food codes and the corresponding USDA recipe files that disaggregate each food code into its component ingredients were reviewed, and each food code corresponding to a fresh pork item was identified. The amount of pork in each of these food codes was specified as the percentage of weight of the pork ingredient in the food code (gram per 100 g food). Foods containing less than 5% pork by weight were excluded from the analysis, given the small amount of pork in the food and that many consumers of the foods would not necessarily identify the food as a pork-containing food.

Fresh pork was identified based on the criteria used by the USDA in an earlier assessment of pork consumption [9]. Specifically, *fresh pork products* were defined as muscle cuts of pork purchased from wholesale markets by food services or from grocery meat counters directly by consumers and cooked just before eating. Individual cuts in the fresh pork category included pork chops, pork steaks, ribs, fresh ham, other fresh pork, and pork parts (such as fat backs, cracklings, ears, tails, heads, feet, neck bones, salt pork, chitterlings, liver, rinds, pork skin, and tripe). Fresh pork included both lean and nonlean cuts.

For labeling purposes, *lean pork* is defined as pork containing less than 10 g of fat, 4.5 g or less of saturated fat, and less than 95 mg of cholesterol per 100 g of product and per reference amount customarily consumed for individual foods [8]. Using this definition, fresh pork products were categorized as lean if the nutrient data for the food met all of the criteria for maximum levels of fat, saturated fat, and cholesterol. The same criteria were used to identify lean pork ingredients in mixtures containing fresh pork based on nutrient data for the pork component. Pork products reported in the survey and meeting these criteria included tenderloin, loin roast, and lean chops.

2.5. Mapping of nutrient composition data to foods reported consumed in NHANES

As previously stated, the source of the nutrient data used to determine the nutrients in pork and total dietary nutrient intakes was the FNDDS 3. Using the USDA retention factors [17] and the USDA recipe and nutrient files supporting the FNDDS 3, the nutrient composition of each ingredient within each food code reported in the NHANES 2003 to 2004 and 2005 to 2006 was calculated. All nutrient values were derived based on nutrients per 100 g food code. This disaggregation of nutrients into the component ingredients was necessary to appropriately estimate the nutrient contributions from pork in food mixtures.

2.6. Statistical analyses

Based on 24-hour dietary recalls reported on day 1 of the dietary recall component of NHANES 2003 to 2004 and 2005 to 2006, adults aged 19 years and older were classified as fresh pork consumers or nonconsumers and separately as fresh lean pork consumers or nonconsumers. Demographic characteristics including age, sex, race/ethnicity, education, and income were summarized for each population of pork consumers, and differences in distributions among demographic groups were assessed using the Pearson χ^2 test.

For each category of pork consumer and the total population of adults, the mean percentage of total daily intakes of 16 nutrients provided by fresh pork and fresh lean pork was estimated based on nutrient intakes unadjusted for energy intake. The 16 nutrients in the analysis included protein, total fat, saturated fat, cholesterol, iron, magnesium, phosphorus, potassium, sodium, zinc, selenium, thiamin, riboflavin, niacin, vitamin B_6, and vitamin B_{12}. Daily intakes of energy and energy-adjusted intakes of the nutrients were estimated for pork consumers vs nonconsumers. Nutrient intake estimates were adjusted for total energy intake using the residual method [18], and mean intakes were compared using the adjusted Wald test. Estimates are presented as means ± SE.

Analyses were run using Microsoft Excel 2007 (Redmond, Wash) and STATA statistical software package version 10 (Stata-Corp, College Station, Tex). All summary statistics and analyses were adjusted for survey design with appropriate statistical weights provided by the National Center for Health Statistics, and SEs and associated confidence intervals were derived using the Taylor series (linearization) method. $P < .05$ was considered statistically significant.

3. Results

3.1. Characteristics of pork consumers

Ten percent of the US adults aged 19 years and older reported consuming fresh pork on the previous day, and 4% reported consuming fresh lean pork (Table 1). Adult men were more likely to consume fresh pork than women (11% ± 0.6% of men vs 9% ± 0.7% of women, $P = .05$), and the percentage of consumers differed across race/ethnicity categories ($P = .05$). No differences were observed in pork consumption by age, education, or percentage of the poverty income ratio.

3.2. Nutritional contributions of fresh pork and nutrient intakes by consumers vs nonconsumers

Adult fresh pork consumers ate an estimated 90.5 g of fresh pork on the day of recall (Table 2). Results from the analysis of mean percent contributions from fresh pork to the total daily nutrient intakes by fresh pork consumers indicated that fresh pork accounted for 10% of energy intake. Among fresh pork consumers on the day of recall, fresh pork accounted for 27% to 31% of total protein, cholesterol, selenium, and thiamin intake and 13% to 21% of the total intake of fat, saturated fat, phosphorus, potassium, zinc, riboflavin, niacin, vitamin B_6, and vitamin B_{12}. On a per

Table 1
Demographic distributions of fresh or fresh lean pork consumers on 1 day of recall, NHANES 2003 to 2006

Demographic group	Fresh pork consumers			Fresh lean pork consumers		
	n	(%) ± SE	*P*	n	(%) ± SE	*P*
Total population	902	10 ± 0.5		377	4 ± 0.3	
Age group (y)			NS			NS
19-50	528	10 ± 0.7		214	4 ± 0.4	
51+	374	9 ± 0.7		163	5 ± 0.5	
Sex			.0186			NS
Male	461	11 ± 0.6		171	5 ± 0.4	
Female	441	9 ± 0.7		206	4 ± 0.5	
Race/ethnicity			.0162			NS
Mexican American	196	11 ± 1.2		57	4 ± 0.9	
Other Hispanic	25	8 ± 2.1		9	2 ± 0.9	
Non-Hispanic white	404	9 ± 0.7		209	5 ± 0.4	
Non-Hispanic black	214	11 ± 1.4		75	5 ± 0.9	
Other race	63	14 ± 2.2		27	5 ± 1.0	
Education			NS			NS
Less than high school	263	10 ± 1.2		77	3 ± 0.6	
High school diploma	219	10 ± 0.9		91	4 ± 0.6	
More than high school	420	9 ± 0.7		209	4 ± 0.5	
Poverty income ratio (%)			NS			NS
≤100	168	10 ± 1.4		61	5 ± 0.9	
>100	734	9 ± 0.6		316	4 ± 0.4	

Data source: NHANES 2003 to 2006, day 1 recalls; n represents size of sample population. All estimates were derived using NHANES sample weights. NS indicates not significant; $P \geq .05$.

capita basis, adults consumed 8.6 g of fresh pork per day, and fresh pork accounted for 1% of energy and up to 3% of macronutrient, vitamin, or mineral intake.

Total energy intakes by adult fresh pork consumers were higher than intakes by nonconsumers ($P < .01$). Adult fresh pork consumers had higher energy-adjusted intakes of

Table 2
Nutritional contributions of fresh pork to the diet of adults (age 19+ years) and total nutrient intakes by fresh pork consumers vs nonconsumers on 1 day of recall, NHANES 2003 to 2006

	Contributions from fresh pork		Total daily intakes [a]		
	Per capita, n = 9490	Consumers, n = 902	Consumers, n = 902	Nonconsumers, n = 8588	*P*
			Mean ± SE	Mean ± SE	
Amount of pork					
Fresh pork (g)	8.6	90.5	90.5 ± 3.53	0	–
Nutrients	% contribution	% contribution			
Energy (kJ)	1.0	10	9739 ± 164.8	9209 ± 80.6	.0059
Protein (g)	2.5	27	90.5 ± 1.21	83.2 ± 0.56	<.0001
Total fat (g)	1.5	16	84.5 ± 1.11	84.2 ± 0.50	NS
Saturated fat (g)	1.7	18	27.6 ± 0.50	27.9 ± 0.18	NS
Cholesterol (mg)	2.8	30	331 ± 7.3	286 ± 3.6	<.0001
Iron (mg)	0.8	8	15.0 ± 0.39	16.0 ± 0.12	.0193
Magnesium (mg)	0.8	9	285 ± 4.7	292 ± 2.8	NS
Phosphorus (mg)	1.5	16	1334 ± 15.5	1348 ± 8.5	NS
Potassium (mg)	1.2	13	2797 ± 52.7	2722 ± 20.1	NS
Sodium (mg)	0.7	8	3754 ± 57.3	3666 ± 17.0	NS
Zinc (mg)	2.0	21	12.1 ± 0.26	12.4 ± 0.17	NS
Selenium (μg)	2.8	29	125 ± 2.1	109 ± 0.8	<.0001
Thiamin (mg)	2.9	31	2.1 ± 0.06	1.6 ± 0.01	<.0001
Riboflavin (mg)	1.3	14	2.2 ± 0.05	2.1 ± 0.02	NS
Niacin (mg)	1.8	19	26.0 ± 0.45	25.3 ± 0.24	NS
Vitamin B_6 (mg)	1.8	19	2.0 ± 0.05	1.9 ± 0.03	.0102
Vitamin B_{12} (μg)	1.8	19	4.7 ± 0.16	5.5 ± 0.10	.0004

Data source: NHANES 2003 to 2006; n represents size of sample population. All estimates were derived using NHANES sample weights. $P \geq .05$.
[a] Mean total daily nutrient intakes adjusted for total energy intake.

Table 3
Nutritional contributions of fresh lean pork to the diet of adults (age 19+ years) and total nutrient intakes by fresh lean pork consumers vs nonconsumers on 1 day of recall, NHANES 2003 to 2006

	Contributions from fresh lean pork		Total daily intakes [a]		
	Per capita, n = 9490	Consumers, n = 377	Consumers, n = 377	Nonconsumers, n = 9113	*P*
			Mean ± SE	Mean ± SE	
Amount of pork					
Fresh lean pork (g)	3.1	70.6	70.6 ± 4.44	0	-
Nutrients	% contribution	% contribution			
Energy (kJ)	0.3	7	9334 ± 290.2	9257 ± 81.9	NS
Protein (g)	1.0	23	91.0 ± 1.77	83.6 ± 0.54	.0011
Total fat (g)	0.4	9	83.4 ± 1.52	84.3 ± 0.49	NS
Saturated fat (g)	0.5	11	26.8 ± 0.66	27.9 ± 0.18	NS
Cholesterol (mg)	1.1	24	314 ± 10.8	289 ± 3.6	NS
Iron (mg)	0.3	6	15.8 ± 0.55	16.0 ± 0.11	NS
Magnesium (mg)	0.3	7	290 ± 7.9	292 ± 2.7	NS
Phosphorus (mg)	0.6	13	1343 ± 23.6	1347 ± 8.2	NS
Potassium (mg)	0.5	11	2858 ± 69.3	2723 ± 20.0	NS
Sodium (mg)	0.3	6	3775 ± 92.9	3669 ± 16.9	NS
Zinc (mg)	0.7	16	12.3 ± 0.43	12.4 ± 0.16	NS
Selenium (μg)	1.1	25	122 ± 2.9	110 ± 0.8	.0008
Thiamin (mg)	1.2	28	2.1 ± 0.09	1.6 ± 0.01	<.0001
Riboflavin (mg)	0.5	11	2.2 ± 0.07	2.1 ± 0.02	NS
Niacin (mg)	0.7	17	26.9 ± 0.71	25.3 ± 0.22	.0382
Vitamin B_6 (mg)	0.8	17	2.1 ± 0.08	1.9 ± 0.03	.0064
Vitamin B_{12} (μg)	0.7	15	5.1 ± 0.29	5.4 ± 0.09	NS

Data source: NHANES 2003 to 2006; n represents size of sample population. All estimates were derived using NHANES sample weights. $P \geq .05$.
[a] Mean total daily nutrient intakes adjusted for total energy intake.

protein, cholesterol, selenium, and thiamin ($P < .0001$) and vitamin B_6 ($P < .05$) than fresh pork nonconsumers and had lower intakes of iron ($P < .05$) and vitamin B_{12} ($P < .01$) than fresh pork nonconsumers. Energy-adjusted intakes of total fat, saturated fat, magnesium, phosphorus, potassium, sodium, zinc, riboflavin, and niacin did not differ between fresh pork consumers and nonconsumers.

3.3. Nutritional contributions of fresh lean pork and nutrient intakes by consumers vs nonconsumers

The mean intake of fresh lean pork was 70.6 g per consumer on the day of dietary recall (Table 3). On the day of intake, fresh lean pork accounted for 7% of energy intake, 23% to 28% of total protein, cholesterol, selenium, and thiamin intake and 11% to 17% of saturated fat, phosphorus, potassium, zinc, riboflavin, niacin, vitamin B_6, and vitamin B_{12} among fresh lean pork consumers. Fresh lean pork accounted for 9% of total fat intake among consumers. On a per capita basis, adults consumed 3.1 g/d of fresh lean pork. Fresh lean pork accounted for 0.3% of energy intake by all adults on the day of recall and approximately 1% or less of macronutrient, vitamin, and mineral intakes.

Energy intakes by adult fresh lean pork consumers were comparable with intakes by nonconsumers. On the day of recall, energy-adjusted intakes of protein, selenium, thiamin, and vitamin B_6 were higher ($P < .01$) by fresh lean pork consumers vs nonconsumers; intakes of niacin by consumers were also higher than those by nonconsumers ($P < .05$). Intakes of total fat, saturated fat, cholesterol, iron, magnesium, phosphorus, potassium, sodium, zinc, riboflavin, and vitamin B_{12} did not differ between the 2 groups.

4. Discussion

Over the last 2 decades, changes in the pork industry have resulted in pork cuts that are leaner and, consequently, more consistent with dietary guidance recommending selection of lean or low-fat meats. However, results from this analysis showed that only 10% of adults consumed fresh pork on a given day, whereas just 4% of adults consumed fresh pork also meeting limits for the "lean" designation on product labeling. Daily intakes of fresh pork by consumers averaged 90.5 g/d, a level within the 62 to 117 g/d range found previously by Smiciklas-Wright et al [10]. Consistent with previous analyses of the consumption of fresh pork, results from this study showed that fresh pork was consumed by a higher proportion of men than women [10]. In addition, results from the current analysis also showed ethnic variations in the proportions of the population consuming fresh pork [9].

Fresh pork and fresh lean pork are among the foods in the protein foods group and, consequently, potentially important dietary sources of protein among consumers. Results from the current analysis indicated that, among all adults, fresh pork or fresh lean pork accounted for less than 3% of the protein consumed on a given day. However,

among consumers of these products, fresh pork and fresh lean pork accounted for 27% and 23% of total protein, respectively, and delivered approximately 24 and 21 g of protein based on energy-adjusted intakes. For an adult consuming a 8368 kJ (2000 kcal) diet, the total recommended intake of foods from the protein foods group, previously referred to as the meat and beans group, is 5.5 oz equivalents per day [1,19]. Adult consumers of fresh pork were estimated to consume approximately 3.2 oz of these pork products, whereas intake of fresh lean pork among consumers was slightly smaller at 2.5 oz. The amount of fresh or fresh lean pork consumed by adults, therefore, was within total recommended amounts in the protein foods group and made a substantial contribution to total protein intake.

Protein is a major structural component of all cells and tissues in the body, and the amino acids comprising proteins serve many diverse roles [20]. The current Recommended Dietary Allowance (RDA) of protein for all adults aged 19 years and older is 0.8 g/kg body weight/day or 56 g/d for men and 46 g/d for women as calculated by the Institute of Medicine [21]. Researchers have suggested that increased protein recommendations for older adults may be warranted to better maintain bone and muscle health during aging [22-24].

Among consumers, fresh pork and fresh lean pork were key sources not only of protein but also of selenium and thiamin, accounting for approximately 25% or more of total intakes while providing just 7% to 10% of total energy. Fresh and fresh lean pork also accounted for 10% or more of total intakes of phosphorus, potassium, riboflavin, niacin, vitamin B_6, vitamin B_{12}, zinc, saturated fat, and cholesterol in the diets of consumers. Fresh pork accounted for 16% of fat among consumers, whereas fresh lean pork accounted for 9% of total fat. Similar to previous findings for fresh pork [11], both fresh and fresh lean pork accounted for a small proportion (up to 3%) of macronutrient and select vitamin and mineral intakes on a per capita basis. The small contributions of these pork products to nutrient intakes on a per capita basis may be attributed to the relatively small percentage of adults consuming fresh or fresh lean pork on a given day.

Inclusion of fresh or fresh lean pork in the diet resulted in higher energy-adjusted intakes of protein, selenium, thiamin, and vitamin B_6 as compared with diets of pork nonconsumers and comparable energy-adjusted intakes of magnesium, phosphorus, potassium, sodium, zinc, and riboflavin. Results of this study also showed no differences in energy-adjusted intakes of total fat or saturated fat intake between fresh or fresh lean pork consumers and nonconsumers. Adult fresh pork consumers' energy-adjusted cholesterol intakes, however, were significantly higher than intakes by nonconsumers, and intakes by fresh lean pork consumers followed a similar but nonsignificant trend. Dietary cholesterol raises blood levels of total and low-density lipoprotein cholesterol, although the potential negative effects of dietary cholesterol on cardiovascular disease are relatively small in comparison with potential adverse effects of saturated or *trans* fatty acid intake [25,26].

Among fresh pork consumers, mean energy-adjusted intakes of vitamin B_{12} and iron were lower than intakes by fresh pork nonconsumers. Consumers of fresh pork consumed an estimated 4.7 μg of vitamin B_{12} and 15.0 mg of iron. The RDA of vitamin B_{12} for all adults is 2.4 μg/d [27], whereas the RDA for iron is 18 mg/d for women aged 19 to 50 years and 8 mg/d for older women and for all adult men [28]. However, adequacy of vitamin B_{12} and iron intakes did not differ between consumers and nonconsumers as determined by comparisons to requirements (data not shown) [29]. Fresh pork nonconsumers on the day of recall presumably consumed other foods from the protein foods group such as beef, poultry, fish, and shellfish, which are also dietary sources of vitamin B_{12} and iron [11].

Overall, results from this assessment indicate that fresh and fresh lean pork made substantial contributions to protein intakes by adult consumers of these products on a day of consumption while also contributing substantially to selenium and thiamin intakes. Fresh and fresh lean pork also contributed to intakes of other important nutrients. With the exception of higher energy and energy-adjusted cholesterol intakes and lower adjusted iron and vitamin B_{12} intakes by fresh pork consumers vs nonconsumers, adjusted nutrient intakes by fresh and fresh lean pork consumers on a day of consumption were comparable with or better than intakes by nonconsumers. As noted above, adequacy of iron and vitamin B_{12} intake did not differ between fresh pork consumers and nonconsumers. The potential negative effects of dietary cholesterol are relatively small compared with potential adverse effects of saturated fat intakes [25,26], and comparisons of saturated fat intakes between consumers and nonconsumers showed no differences. Results of this analysis, therefore, support the hypothesis that, on a day of consumption, overall nutrient intakes by fresh and fresh lean pork consumers are comparable with or better than intakes by nonconsumers who are presumably selecting alternate foods from the protein foods group. Dietary guidance for Americans supports a nutrient-dense diet and specifically recommends selection of lean or low-fat meat and poultry when choosing meat products [1]. Findings from this study indicate that selection of lean cuts of fresh pork can help to fulfill nutrient needs provided by the protein foods group while also helping to limit energy intakes.

There are several strengths of the current analysis. The estimates were based on a nationally representative sample of the population in the United States using the most current data available from the USDA at the time of the analysis. Food mixtures were disaggregated to identify fresh pork consumed as components of mixed dishes, and nutrient retention factors were used to most accurately estimate nutrient contributions from these ingredients.

The study is not without limits. As with all studies based on dietary surveys, the accuracy of the intake estimates was limited by the accuracy of recalls provided by survey

participants and the specificity to which the reported foods were mapped in the dietary recall records. In addition, the estimates of intake were based on 1 day of dietary recall and, therefore, may not necessarily be representative of all fresh pork consumers and total usual nutrient intakes by consumers of these products. Furthermore, only a small fraction of the adult population reported consuming fresh or fresh lean pork, which may have limited the power to detect statistically significant differences, if any, between consumers and nonconsumers.

In summary, among consumers, fresh pork and fresh lean pork can be important dietary sources of protein, selenium, and thiamin while contributing relatively small amounts to total energy intakes. Fresh and fresh lean pork also contribute to intakes of phosphorus, potassium, riboflavin, niacin, vitamin B_6, vitamin B_{12}, zinc, cholesterol, fat, and saturated fat in the diets of consumers. Diets including fresh or fresh lean pork provided higher energy-adjusted amounts of protein, selenium, thiamin, and vitamin B_6 as compared with diets of adults not consuming fresh pork on a day of consumption and comparable amounts of both total fat and saturated fat. Consumption of fresh lean pork is consistent with dietary guidance recommending selection of lean or low-fat meats, and selection of fresh lean pork products by current nonconsumers could increase dietary variety without adversely affecting nutrient intake.

Acknowledgment

This research was supported by the National Pork Board.

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