NUTRITIONAL AND ECONOMIC ASPECTS OF CONVENIENCE AND NONCONVENIENCE FOODS

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OUTLOOK '83

1983 Agricultural Outlook Conference, Session #25
Washington, D.C.

For Release: Wednesday, December 1, 1982

INTRODUCTION

The use of convenience foods allows consumers to transfer food preparation from the kitchen to the processor. During the past few decades, a myriad of convenience foods, particularly canned foods, frozen items, and mixes, have been introduced into the marketplace. In 1976, expenditures on processed products amounted to nearly $50 billion. Of this total, $8.6 billion were spent on ready-to-cook items, $7.6 billion on ready-to-heat items, and $33.3 billion on ready-to-eat products.[1]

A paucity of economic and nutritional information exists regarding convenience and nonconvenience foods used by U.S. households. In an attempt to add to this sparse store of knowledge, research has been conducted by an interdisciplinary team composed of nutritionists and agricultural economists. The purposes of this research were: (1) to develop operational definitions of convenience and nonconvenience foods, (2) to determine nutrient contributions of the various food classes used by U.S. households, and (3) to ascertain key determinants of convenience and nonconvenience food use according to their money value and share of food dollar.

DATA SOURCE

The source of the data was the household phase of the 1977-78 Nationwide Food Consumption Survey (NFCS), a stratified probability sample of approximately 15,000 households in the 48 conterminous states. This information refers to food used in the household in a 7-day period and includes not only what was eaten by household members and guests but also food that was discarded or eaten by pets. The data, therefore, should not be interpreted as representative of food actually eaten.

CLASSIFICATION SCHEME

Each food code in the household portion of the NFCS was assigned a convenience or nonconvenience status according to the following definitions:

1. Basic convenience - foods where processing is more related to a preservation method than ease of preparation; foods with a single or limited number of ingredients; foods with time or energy inputs but not culinary expertise built in.
2. Complex convenience - foods which have a high level of time saving and/or energy inputs and culinary expertise built in; multi-ingredient prepared mixtures.

[1]Livingston, G.E. and C.M. Chang, "Commercial Production of Ready-To-Serve Food in the United States", In <u>How Ready Are Ready-To-Serve Foods?</u> K. Paulus, Editor, Basel: S. Karger, 1978, pp. 35-48.

3. Manufactured convenience - foods which have no home-prepared counterpart.
4. Nonconvenience - fresh (unprocessed) foods; home frozen or home canned or home preserved food items; and ingredient foods. Ingredient foods are processed food products used in food preparation, usually in the most basic form in their category, that either cannot be or are not commonly prepared in the home.

These definitions were based, in part, on work by Traub and Odland[2]. Examples of foods in each of the four categories are shown in Table 1.

Of more than 4000 food codes used in the survey, 32.7 percent were basic convenience, 28.8 percent were complex convenience, 3.5 percent were manufactured convenience, and 35.0 percent were nonconvenience. An individual food code referred to a single food item in some cases and to clusters of similar foods in other instances. Therefore, the distribution of food codes does not reflect precisely the proportion of foods in the classes.

Convenience and nonconvenience foods were ranked on the number of households which reported using them during the survey week. The top 10 convenience food items were (in descending order): white bread (enriched) cola soft drinks, saltine-type crackers, peanut butter, meat frankfurters, frozen orange juice concentrate, bologna, catsup, processed American cheese, and powdered instant coffee. The top 10 most frequently reported nonconvenience foods (in order) were: granulated white sugar, fresh whole white potatoes, whole milk, fresh lettuce (crisphead varieties), fresh large eggs, fresh apples, fresh tomatoes, fresh onions, stick margarine, and fresh bananas.

NUTRIENT CONTRIBUTIONS OF CONVENIENCE AND NONCONVENIENCE FOOD CLASSES

Mean food energy and nutrients per nutrition unit per day were computed to determine the nutrient contribution of each convenience and nonconvenience class of foods used by the households. The number of nutrition units in a household was the sum of the recommended dietary allowance (RDA) for that nutrient for persons eating in the household (adjusted for meals eaten away from home) divided by the RDA for the adult male.

Contributions of food energy (kilocalories) by the convenience and nonconvenience classes were: 15 percent from basic convenience, 23 percent from complex convenience, 7 percent from manufactured convenience, and 55 percent from nonconvenience foods (Table 2). Proportions of nutrients provided by nonconvenience foods were somewhat comparable (50-65 percent) to the proportion of kilocalories, except that 42 percent of carbohydrate and thiamin and 71 percent of vitamin B_{12} were from this food class.

The distribution of nutrients provided by the convenience classes was variable. For example, basic convenience foods on the average provided 25 percent of the vitamin A and 42 percent of the vitamin C; complex convenience food contributions of these vitamins were only 11 and three percent, respectively. Manufactured convenience foods represented a smaller proportion of food items than the other food classes and thus lower percentages of most nutrients in the foods used by the households. However, manufactured convenience foods provided as much vitamin B_6 as that provided by

[2] Traub, L. G. and D. Odland, "Convenience Foods and Home-Prepared Foods: Comparative Costs, Yield, and Quality," Agricultural Economic Report #429, USDA, Economics, Statistics, and Cooperative Service (August 1979).

Table 1. SELECTED FOODS IN CONVENIENCE AND NONCONVENIENCE CLASSES

Basic Convenience	Complex Convenience	Manufactured Convenience	Nonconvenience
Processed cheese	Cheese balls	Imitation cheese spreads	Natural cheeses
Dry milk and canned condensed and evaporated milk	Frozen desserts containing milk	Soy base infant formula	Fluid whole and skim milk
Soft tub margarine	Salad dressings		Cooking oils; stick margarine; butter
Quick cooking and instant cereals	Biscuit mix	Ready-to-eat breakfast cereals	Regular cooking oatmeal
Self-rising flour and cornmeal	Pancake, cake, and cookie mixes	Saltine and soda crackers	Flour; cornmeal; rice, macaroni
Dry bread crumbs	Ready-to-eat and commercially frozen breads, biscuits, pies, cakes, doughnuts, and cookies	Breakfast toaster pastry; breakfast bars	Home frozen pies, cakes, cookies, and waffles
Commercially canned and frozen meat, poultry and fish	Hot dogs, bologna and other luncheon meats; commercially frozen breaded fish	Canned meal replacement or supplement	Fresh eggs; fresh and home frozen meat, poultry, and fish
Whipped honey	Commercially prepared jam, jelly; chocolate, coconut and nut candies	Gum drops; jelly beans; dietetic candy	Brown and white sugar; honey; home preserved jam and jelly
Commercially prepared french fries	Potato chips		Cooked, fresh, and home canned potatoes
Commercially frozen and canned vegetables and vegetable juices	Commercially frozen vegetables with sauce		Fresh, home canned, and home frozen vegetables; dried peas and beans
Commercially canned and frozen fruits and fruit juices	Commercially canned fruit pie filling		Fresh, home frozen, and home canned fruits
Powdered instant coffee and tea	Beer and wine	Gin and rum	Bean or ground coffee and loose leaf or bag tea
Commercially canned ades, punches, drinks, and fruit nectar	Root beer	Soft drinks	Home canned fruit nectar
Olives	Commercially prepared pickles, catsup, relishes		Home prepared pickles and relishes
Shelled nuts; peanut butter			Nuts, in shell
	Ready-to-eat, commercially canned and frozen entrees and side dishes; commercially canned, frozen, and dehydrated soups		Home frozen and home canned mixtures including soups

Table 2. MEAN NUTRIENT LEVEL PER HOUSEHOLD MEMBER[a] PER DAY FOR CONVENIENCE AND NONCONVENIENCE FOOD CLASSES

Nutrient	Basic convenience		Complex convenience		Manufactured convenience		Nonconvenience	
	Mean	%	Mean	%	Mean	%	Mean	%
Food energy (kilocalories)	576 (391)[b]	15	889 (501)	23	278 (231)	7	2112 (1041)	55
Protein (g)	21.1 (18.8)	16	20.9 (13.0)	16	3.9 (3.9)	3	82.6 (38.6)	64
Fat (g)	19.4 (17.9)	13	29.6 (20.4)	20	3.6 (4.7)	2	96.5 (53.4)	65
Carbohydrate (g)	55.6 (44.7)	17	97.6 (54.8)	28	43.0 (36.2)	13	140.2 (44.2)	42
Calcium (mg)	195.3 (211.0)	18	182.0 (117.0)	17	31.6 (39.5)	3	661.6 (393.3)	62
Iron (mg)	2.70 (3.28)	17	3.13 (2.09)	19	2.02 (2.22)	12	8.44 (5.25)	52
Magnesium (mg)	106.7 (78.8)	21	81.9 (57.9)	16	33.9 (43.7)	7	278.2 (141.7)	56
Phosphorus (mg)	346.7 (294.3)	19	273.5 (195.8)	16	91.2 (101.4)	5	1080.8 (513.0)	60
Vitamin A (I.U.)	1655 (1498)	25	726 (807)	11	806 (914)	12	3507 (2320)	52
Thiamin (mg)	0.20 (0.28)	14	0.35 (0.31)	24	0.29 (0.40)	20	0.61 (0.53)	42
Riboflavin (mg)	0.19 (0.36)	9	0.33 (0.29)	15	0.32 (0.45)	15	1.31 (0.86)	61
Preformed niacin (mg)	6.60 (5.73)	19	6.37 (4.13)	18	4.43 (5.13)	13	17.19 (10.41)	50
Vitamin B_6 (mg)	0.17 (0.23)	11	0.11 (0.18)	7	0.29 (0.41)	18	1.04 (0.60)	65
Vitamin B_{12} (mcg)	0.88 (3.31)	14	0.62 (1.06)	10	0.35 (0.80	5	4.64 (6.27)	71
Vitamin C (mg)	64.3 (64.3)	42	5.3 (7.7)	3	7.2 (10.4)	5	75.2 (65.2)	50

[a]Houshold member is "nutrition unit" defined as the sum of the RDA for that nutrient for persons eating in the household (adjusted for meals eaten away from home) divided by the RDA for the adult male; fat and carbohydrate are based on 21-meal equivalents

[b]Standard deviation in parentheses

the other two convenience classes. This class also contributed significant proportions of other B vitamins - thiamin, riboflavin, and preformed niacin.

Pearson product-moment correlation coefficients indicated that, with the exception of calcium, vitamin A, and carbohydrate, nutrient level per nutrition unit was positively associated with the share of the food dollar allocated to nonconvenience foods (Table 3). Although in most cases statistically significant, the magnitudes of the respective relations were relatively small, ranging from 0.0198 for magnesium to 0.1141 for iron. With some exceptions, nutrient level per nutrition unit was negatively associated with the share of the food dollar allocated to convenience classes. However, similar to the relations for nonconvenience foods, the correlation coefficients, although generally statistically significant, were comparatively small.

Nutrient Densities and Nutrients Per Dollar

Mean nutrient densities and mean nutrients per dollar of convenience and nonconvenience classes of foods used by households were computed (Tables 4 and 5). Nutrient density was defined as nutrients per 1,000 kilocalories. Nutrients per dollar were computed as the ratio of each nutrient in the food classes used by households to the dollar value of those food classes. Tests of hypotheses concerning the equality of mean nutrient densities and mean nutrients per dollar for the convenience and nonconvenience classes were made using one-way analysis of variance. Tests of all possible pairwise differences for each nutrient were made using Duncan's Multiple Range Test. To compensate for the substantial sample sizes, the signifcance level chosen was 0.01. With a few exceptions, pairwise differences in mean nutrient densities and mean nutrients per dollar among the four food classes were statistically different for each nutrient.

The belief held by many consumers that processed foods are expensive sources of low levels of nutrients was not confirmed by nutrient densities and nutrients per dollar. With few exceptions the mean cost of the nutrients was lower for convenience foods than for nonconvenience foods. No single food class was consistently the best source of all nutrients per 1,000 kilocalories. The mix of food items and the prevalence of use of specific foods within the classes contributed, in part, to the nutrient densities of the food classes.

Complex convenience foods provided the most kilocalories per dollar. Fresh and frozen meats and cheese and milk products in the basic convenience and nonconvenience food classes contributed to high protein densities and high levels of protein per dollar. Basic convenience foods also provided a high level of protein per dollar. Fat content of convenience foods was lower than that of nonconvenience foods, perhaps because untrimmed fresh meats and table and cooking fats were classified as nonconvenience items. On the other hand, on a per unit basis fat in the nonconvenience class was less expensive than in the convenience classes.

Carbohydrate density and level of carbohydrate per dollar were higher for the convenience food classes than for the nonconvenience food class. As expected, the chief and least expensive source of energy in the manufactured convenience class was carbohydrate. A large proportion of the foods in this class such as ready-to-eat cereals, candies, and soft drinks, contain low levels of fat and protein and high levels of carbohydrate.

Table 3. PEARSON PRODUCT-MOMENT CORRELATION COEFFICIENTS OF NUTRIENT LEVEL PER HOUSEHOLD MEMBER[a] AND SHARE OF FOOD DOLLAR FOR CONVENIENCE AND NONCONVENIENCE FOOD CLASSES

Nutrient	Basic convenience	Complex convenience	Manufactured convenience	Nonconvenience
Food energy	-0.0479	-0.0152[b]	0.0015[b]	0.0418
Protein	0.0029[b]	-0.0818	-0.0799	0.0869
Fat	-0.1120	-0.0056[b]	-0.0297	0.0913
Carbohydrate	-0.0222	0.0488	0.0558	-0.0415
Calcium	0.0472	-0.0180[b]	-0.0227	-0.0099[b]
Iron	-0.0212[b]	-0.1131	-0.0552	0.1141
Magnesium	0.0272	-0.0430	-0.0213[b]	0.0198[b]
Phosphorus	0.0116[b]	-0.0709	-0.0584	0.0646
Vitamin A	0.1258	-0.0470	0.0105[b]	-0.0568
Thiamin	-0.0699	-0.0418	0.0276	0.0638
Riboflavin	-0.0642	-0.0296	0.0243	0.0530
Preformed niacin	-0.0002[b]	-0.0798	-0.0276	0.0659
Vitamin B_6	-0.0796	-0.0516	0.0325	0.0749
Vitamin B_{12}	0.0072[b]	-0.0246	-0.0261	0.0227
Vitamin C	0.1197	-0.1402	-0.0557	0.0381

[a]Household member is "nutrition unit" defined as the sum of the RDA for that nutrient for persons eating in the household (adjusted for meals eaten away from home) divided by the RDA for the adult male

[b]Not statistically different from zero at the 0.01 level

TABLE 4. MEAN NUTRIENT DENSITIES[a] FOR CONVENIENCE AND NONCONVENIENCE FOOD CLASSES

NUTRIENT	BASIC CONVENIENCE	COMPLEX CONVENIENCE	MANUFACTURED CONVENIENCE	NONCONVENIENCE
Protein (g)	38.23 (20.35)[b]	24.97 (6.18)	15.25 (9.22)	42.56 (11.53)
Fat (g)	40.09[c] (21.73)	40.06[c] (13.49)	15.13 (11.23)	56.35 (12.30)
Carbohydrate (g)	125.70 (56.14)	129.65 (35.67)	196.63 (41.49)	82.21 (31.52)
Calcium (mg)	452.17 (336.93)	274.46 (110.01)	144.42 (121.51)	445.12 (243.75)
Iron (mg)	7.72 (8.37)	5.59 (2.15)	12.06 (8.53)	6.17 (1.85)
Magnesium (mg)	229.13 (201.27)	100.29 (44.44)	138.29 (140.48)	150.53 (58.16)
Phosphorus (mg)	788.79 (345.69)	430.05 (147.22)	452.22 (409.03)	699.23 (204.14)
Vitamin A (I.U.)	3546.40 (4254.39)	867.87 (1087.26)	3417.00 (3429.18)	1923.16 (1405.47)
Thiamin (mg)	0.32 (0.34)	0.40 (0.30)	1.07 (1.12)	0.27 (0.19)
Riboflavin (mg)	0.30 (0.50)	0.36 (0.25)	1.24 (1.31)	0.65 (0.36)
Preformed Niacin (mg)	12.46 (12.10)	7.30 (2.98)	17.28 (14.25)	8.26 (3.61)
Vitamin B_6 (mg)	0.30 (0.34)	0.12 (0.17)	1.22 (1.37)	0.57 (0.24)
Vitamin B_{12} (mcg)	1.83 (6.63)	0.78 (1.44)	1.47 (2.87)	2.66 (3.94)
Vitamin C (mg)	162.43 (172.07)	7.55 (12.55)	34.63 (39.34)	47.06 (42.77)

[a]Nutrient density = nutrients per 1,000 kilocalories
[b]Standard deviation of households in parentheses
[c]Values in the same row not statistically different at the 0.01 level on the basis of Duncan's Multiple Range Test

TABLE 5. MEAN NUTRIENTS PER DOLLAR FOR CONVENIENCE AND NONCONVENIENCE FOOD CLASSES

NUTRIENT	BASIC CONVENIENCE	COMPLEX CONVENIENCE	MANUFACTURED CONVENIENCE	NONCONVENIENCE
Food Energy (kilocalories)	1092.96 (671.76)[a]	1656.03 (621.99)	1471.67 (686.61)	1258.22 (410.21)
Protein (g)	37.23 (21.11)	40.65 (18.12)	23.95 (18.59)	50.80 (13.19)
Fat (g)	45.15 (42.56)	66.28 (33.47)	24.06 (23.93)	70.68 (26.83)
Carbohydrate (g)	138.10 (123.42)	217.06 (109.39)	290.80 (136.58)	106.55 (63.62)
Calcium (mg)	486.31 (506.67)	461.13 (269.52)	203.86 (183.36)	535.33 (304.13)
Iron (mg)	7.67[b] (9.48)	9.35 (5.17)	18.39 (15.59)	7.44[b] (2.50)
Magnesium (mg)	213.42 (122.72)	160.01 (83.46)	201.39 (217.17)	179.11 (60.42)
Phosphorus (mg)	842.94[b] (740.08)	700.99 (372.40)	640.39 (586.39)	840.21[b] (267.34)
Vitamin A (I.U.)	3248.52 (2924.90)	1282.95 (1328.54)	5150.36 (6081.49)	2198.21 (1258.96)
Thiamin (mg)	0.39 (0.64)	0.72 (0.70)	1.68 (1.95)	0.36 (0.27)
Riboflavin (mg)	0.35 (0.61)	0.62 (0.52)	1.92 (2.25)	0.81 (0.47)
Preformed Niacin (mg)	11.82[b] (8.36)	11.99[b] (6.37)	26.75 (25.95)	9.70 (3.38)
Vitamin B_6 (mg)	0.31 (0.36)	0.17 (0.24)	1.87 (2.45)	0.68 (0.28)
Vitamin B_{12} (mcg)	1.51 (4.91)	1.17 (1.98)	2.16 (4.94)	3.16 (4.35)
Vitamin C (mg)	148.16 (141.93)	11.26 (14.09)	52.86[b] (70.38)	52.57[b] (36.82)

[a]Standard deviation in parentheses
[b]Values in same row not statistically different at the 0.01 level on the basis of Duncan's Multiple Range Test

The high nutrient densities and high nutrients per dollar of calcium in nonconvenience and basic convenience foods might be expected, since milk and most cheeses, concentrated sources of calcium, were included in these categories. Manufactured convenience foods provided more iron per thousand kilocalories and per dollar then did the other food classes. Fortification of ready-to-eat cereals may account for this high level. The highest nutrient densities and nutrients per dollar for magnesium were found in the basic convenience class, which included frozen and canned vegetables and fruits. Phosphorus was provided at the highest density and at the least cost in the basic convenience and nonconvenience food classes.

Manufactured convenience foods provided high nutrient densities at relatively low cost for vitamin A, thiamin, riboflavin, preformed niacin, and vitamin B_6, probably a result of fortification of ready-to-eat grain foods. Basic convenience foods also provided a high nutrient density of vitamin A at a low cost. Additionally, nutrient density and nutrients per dollar of vitamin C in the basic convenience food class were substantially higher than in the other food classes. Frozen and canned vegetables and fruits, sources of these vitamins, were in this convenience category. Vitamin B_{12}, found almost exclusively in animal foods, was present at the highest ratio to kilocalories and at the lowest cost in nonconvenience foods.

MONEY VALUE AND SHARE OF FOOD DOLLAR

To enhance the understanding of food purchase patterns in the United States, this research investigated the nature and the magnitude of the influence of various socioeconomic and demographic variates on the money value and the share of the food dollar for convenience and nonconvenience foods. The particular attributes included region, urbanization, income class, household size in terms of 21-meal equivalents, season, origin and race of respondent, occupation of the household head, and age, education, and employment status of the household manager (meal planner). The impact of the various socioeconomic and demographic characteristics is likely to reflect, in part, differences in tastes and preferences, culture, and infrastructure of households. The statistical analysis entailed the use of analysis of covariance -the blending of analysis of variance and regression analysis.

On the average, the money value of all food, nonconvenience foods, and convenience foods used per household was $46.69, $25.69, and $21.00, respectively. The average weekly money value of basic convenience, complex convenience, and manufactured convenience foods was $8.48, $9.04, and $3.48, respectively. On the average, households spent approximately 55 percent of the food dollar on nonconvenience foods, 18 percent on basic convenience foods, 19 percent on complex convenience foods, and 7 percent on manufactured convenience foods, shares similar to percentages of food energy contributed by the respective food classes.

The major determinants of convenience and nonconvenience foods according to share of food dollar are exhibited in Table 6. Generally, white, non-Spanish households located outside the South in central city and suburban areas in which the household manager was less than 34 years of age, employed (part-time or full-time), and at least a high school graduate, allocated significantly larger portions of their food dollar to convenience foods than other types of households. However, Spanish, nonwhite households located in the South in nonmetropolitan areas in which the household manager is at least

TABLE 6. MAJOR DETERMINANTS OF CONVENIENCE AND NONCONVENIENCE FOODS ACCORDING TO SHARE OF FOOD DOLLAR

Determinant	Basic convenience Class	Complex Convenience Class	Manufactured Convenience Class	Nonconvenience Class
Geographical Region	Northeast West	North Central Northeast West	North Central South West	South
Urbanization	Central City	Suburban Central City	Suburban Central City	Nonmetropolitan
Season	Winter Fall Spring	Winter	NSD[a]	Summer
Race	Non-black	White	White	Non-White
Income Class	NSD	NSD	High-income classes (Over $30,000, $20,000 to $29,999)	Low-income classes (Under $5,000 $5,000 to $9,999 $10,000 to $14,999)
Occupation of Household Head	White-collar	Blue-collar	NSD	NSD
Education of Household Manager (Meal Planner)	At least a high school graduate	NSD	At least a high school graduate	Not a high school graduate
Age of Household Manager (Meal Planner)	21 to 34 over 65	Less than 21 21 to 34	Less than 21 21 to 34	Over 65 35 to 64
Employment Status of Household Manager (Meal Planner)	NSD	Employed	Employed	Unemployed
Origin	Non-Spanish	Non-Spanish	NSD	Spanish
Household Size in 21-Meal Equivalents	Yes	NSD	NSD	Yes

[a]No statistically significant difference(s)

35 years of age, unemployed, and not a high school graduate, allocated larger portions of their food dollar to nonconvenience foods than other types of households. Also, households typically expended significantly larger shares of their food dollar on convenience foods in the winter and nonconvenience foods in the summer than in the other seasons. Interestingly, household size and household income had seemingly imperceptible influences on the share of food dollar allocated to convenience foods. But, low-income households and households relatively large in size in terms of 21-meal equivalents generally expended larger shares of their food dollar for nonconvenience foods. With few notable exceptions, the aforementioned results also held with respect to money value of convenience and nonconvenience foods.

Given information on household size in 21-meal equivalents and socio-economic and demographic characteristics, the estimated statistical models were used to make predictions of weekly money value and share of food dollar of convenience and nonconvenience foods. Various socioeconomic and demographic profiles were constructed to examine behavioral patterns. To illustrate, two scenarios are presented.

Scenario I

Region (South), urbanization (nonmetropolitan), season (summer), race of respondent (Black), income class (under $5,000), occupation of household head (blue-collar), education of household manager (not a high school graduate), age of household manager (35-64), employment status of household manager (unemployed), origin of respondent (Spanish).

Scenario II

Region (Northeast), urbanization (suburban), season (winter), race of respondent (white), income class (over $30,000), occupation of household head (white-collar), education of household manager (high school graduate), age of household manager (21-34), employment status of household manager (part-time or full-time employment), origin of respondent (non-Spanish).

A household with five 21-meal equivalents that fits the specification of the first scenario would spend $35.68 on nonconvenience foods (roughly 59 percent of the food dollar), $9.25 on basic convenience foods (15 percent), $11.53 on complex convenience foods (19 percent), and $4.23 on manufactured convenience foods (approximately 7 percent). On the other hand, households with the same household size that fits the specification of the second scenario would spend $47.04 on nonconvenience foods (51 percent of the food dollar), $17.72 on basic convenience foods (19 percent), $19.44 on complex convenience foods (21 percent), and $7.95 on manufactured convenience foods (approximately 9 percent). The tremendous wealth of detail in the classifications of the socioeconomic and demographic variates permits the construction of many unique profiles. Such profiles are useful for market research programs by the food industry and for planning relevant educational materials for population groups.

SUMMARY

Food items used by households in the 1977-78 Nationwide Food Consumption Survey were classified to reflect the convenience or nonconvenience status of each item: (1) basic convenience, (2) complex convenience, (3) manufactured convenience, and (4) nonconvenience.

Basic convenience and nonconvenience foods provided more protein and calcium per dollar and per 1,000 kilocalories than complex convenience and manufactured convenience foods. The highest level of fat per 1,000 kilocalories was present in nonconvenience foods, the class which included untrimmed fresh meats, most milk and cheese products, and table and cooking fats. As the share of the food dollar spent for convenience foods increased, there was an associated small decrease in the nutrient level per nutrition unit for food energy and all nutrients except calcium, vitamin A, and carbohydrate.

Approximately 55 percent of the dollar for food at home was spent on nonconvenience foods, 18 percent on basic convenience foods, 19 percent on complex convenience foods, and 7 percent on manufactured convenience foods. In general, white, non-Spanish, households, located outside the South in central city and suburban areas, in which the meal planner was less than 34 years of age, employed, and at least a high school graduate allocated larger portions of their food dollar to convenience foods than did other households.

SUSTAINING U. S. AGRICULTURAL PRODUCTIVE CAPACITY

I am honored to take part in this Outlook Conference, especially since this is the first year I have been asked to speak at the Conference. In the company of so many distinguished academic and professional experts, I am more than a little humble.

In fact, I was surprised at first that for this session your two main participants are not academic experts in conservation, research and technology, but instead both come from the policy-making arena. Congressman Brown and I are accompanied here today by a distinguished resource economist, Dr. Emery Castle of Resources for the Future, and by an outstanding USDA civil servant in the field of conservation program evaluation, Gordon Nebeker. However, it is Congressman Brown and myself who will deliver the main presentations here this morning.

Conservation, Research, Technology Programs Raise Policy Questions, Carry Political Weight

How is it that your committee, with all the technical and professional experts that abound in the fields of conservation, research and technology, chose instead to invite two persons to this panel who live by the political sword? Without endeavoring to put myself in the same league as Congressman

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Remarks by Richard D. Siegel, Deputy Assistant Secretary for Natural Resources and Environment, U.S. Department of Agriculture, at Session 26, "Conservation, Research and Technology", December 1, 1982, 8:15 a.m., Room 104-A, Administration Building

Brown, I did serve for a number of years as a staff member in the House and Senate so, like him, my Washington roots are on Capitol Hill.

I have concluded that this was an appropriate selection of speakers. For as important as conservation, research and technology are in their own right as fitting subjects for this Outlook Conference, they are also the subjects of active policymaking and carry much political weight in the Federal Government today.

Conservation, research and technology are supported by major programs in this Department. SCS has 13,000 employees and the Science and Education agencies, 9,000. These programs are closely followed by Congressional subcommittees such as the one headed by Congressman Brown and by other influential members of the House and Senate. Their appropriations approach $2 billion annually, a major share of this Department's discretionary budget.

There is a vast research establishment both inside the Department of Agriculture and at the grass roots in the various land grant universities. There is a conservation establishment that spreads across 27 different programs in eight separate agencies within the Department and out into the country. In nearly all the rural counties there are soil and water conservation districts, and they number close to three thousand. Serving on the boards of these districts are about seventeen thousand public spirited volunteers. Then, as a parallel structure in each county there are the county committees that serve under the ASCS and award cost-sharing payments for conservation measures.

Both the research and the conservation fields are people-intensive. They are densely populated with organizations at the county, State, and national levels that all make their presence felt on Capitol Hill. They are highly charged political minefields that must be negotiated carefully. No doubt this is why politicians, whatever their technical background may be, feel so much at home in the politics of agricultural research and the politics of conservation.

Both agricultural research and soil conservation stand as politically durable Federal programs which have held their own over the years in gaining support from Congress. We expect this support certainly to continue. Nevertheless, voices have been raised against both the research and the conservation programs in recent years, charging that there were no longer relevant to the real needs of the agricultural community and the entire nation. There is increased fiscal competition for scarce Federal funds. So in this Administration, we are making serious efforts to reevaluate these programs. They are too important to the mission of USDA to ignore. Research, technology and conservation, whether done by the private sector alone or with Federal support, are the underpinnings for maintaining the productive capacity of U.S. agriculture. The USDA programs in these areas have much to be proud of so far, and if they are kept up to date with the needs of these times, they can continue to serve a crucial role and do it with dedication and excellence.

As politicians we in policy roles are practical enough to know what long-standing support these programs have throughout the country and that their constituencies do not want them to change radically or very much at all. At the same time, it is our duty, as we know it is Congressman Brown's in his role as a Subcommittee Chairman, to take a fresh look at our research and conservation programs and then call the shots the way we see them. While our policy conclusions and those Congressman Brown reaches do not always agree, we know that he, like us, is committed to careful analysis of our on-going programs, and that he does not shrink from proposing unpopular measures if he sincerely feels they are in the best interest of the nation.

So in my remarks this morning, I would like to talk about both the problems we face in soil and water resources and the policies we in this Administration have for carrying out our responsibility for soil and water conservation programs. We have no ultimate answer to the question, "Will we sustain our agricultural productive capacity?". The individual producers themselves, in the sum total of the decision they make, will decide this. A profound influence will come from the research sector, as we see future improvements in technology, for example, the breakthroughs in plant genetics and new equipment. But the soil and water conservation programs in this Department have been and will be critical, as USDA tracks these developments, sponsors some of them, and serves the agricultural community with information, its traditional role.

Soil Conservation: Many Agencies Have Roles

The soil and water conservation mission in USDA is carried out by technical assistance, financial assistance in the form of cost-sharing grants and loans for conservation measures, by education and by research. These 27 separate programs, as I have said, involve eight separate agencies within the Department of Agriculture. They are the SCS and ASCS as main players, but also the Farmers Home Administration, the Forest Service, ERS, ARS, Extension and the Cooperative State Research Service. These programs draw their authority from 16 different pieces of legislation.

The presence of so many agencies and programs in the conservation business in USDA means that anyone in a policy position trying to stake out the key issues in soil and water conservation and then designing programs to address these issues does not start with a clean slate, nor can he operate with a free hand. The various agencies within the Department believe in the worth of their respective different programs and so do the members of Congress who have been the authors and supporters of these programs over the years. It is easy for newcomers to become enmeshed in this structure and lose sight of the overall aim of these conservation programs. Policy makers in the conservation arena spend a disproportionate amount of their time on the internal relationships among the various agencies and programs that are carrying out the conservation functions inherited from previous Administrations and Congresses. This saps valuable time and energy and leaves less opportunity to study the big issues and propose far-reaching changes that may be needed to address them.

RCA: An Opportunity To Study Data, and See Where Problems Existed

This is why, upon coming into this Administration, Assistant Secretary Crowell and I were extremely fortunate to have before us as an unfinished task the completion of the National Program for Soil and Water Conservation mandated by the Soil and Water Resources Conservation Act of 1977 (RCA). The Administration before us had completed the 1980 appraisal required by the Act and had begun but not completed the national program. Secretary Block set us to work to complete the program by the end of 1981, and in October 1981, a preferred program of the Department was ready for Secretary Block to issue to the public for public comment. We expect the final program to be sent shortly to Congress by the President.

We were lucky to be given this assignment in the first year of our work at USDA because we were able to step back and take a long look at the nature of the soil and water resource problems facing the nation and we were under deadline pressure to draft a program, a Department-wide program, to meet those problems.

The Row-Crop Explosion

The RCA appraisals and the preferred program were all issued and widely circulated during 1981. I will briefly summarize what they revealed about soil erosion. The appraisal data disclosed that while soil erosion was not a serious problem on two-thirds of America's cropland, on the remaining one-third soil erosion exceeded tolerable levels of five tons of soil lost per acre per year, and certain areas were threatened with severe loss in agricultural productivity because of excessive erosion.

This data, drawn from the 1977 Natural Resources Inventory, went hand-in-hand with the phenomenal changes that those familiar with agriculture knew were taking place in the 1970s. The explosion in production of corn and soybeans, the Cinderella crop of the 1970s, meant that farmers sought more and more land for row-crop cultivation. Row-crops found their way onto land that was previously used on the typical farm for pasture. This pasture land was newly available for row-crops as cattle raising went off the regular farm to be a specialized activity at feedlots. A typical farm in the 1970s no longer found it rational or profitable to be diversified by growing a variety of crops, maintaining some land in pasture or rotating fields between crops and pasture. Farms went in for "monoculture" of corn, soybeans, and cotton in larger and larger units. Continuous year-in-year-out cropping became the rule, as pesticides and new, larger equipment became available to make this kind of farming both possible and highly efficient. All of this put additional strain on the best soil and brought into crop production for the first time sloping fields, better suited by far for pasture, that were prime candidates for erosion. This empirical view of how farming was changing was borne out in the statistics that came from the 1977 NRI.

The NRI, however, arrived at this significant fact as well. On ten percent of the cropland, erosion was over ten tons per acre. These acres accounted for 54 percent of all sheet and rill erosion and 89 percent of all excess soil losses in the nation. Let's look at some of these areas:

--The Palouse area of southeastern Washington, and neighboring portions of Idaho and Oregon. The erosion rate there is 20-30 tons per acre on many areas. On the steeper slopes, 100 to 200 tons per acre. Yet this is one of the most productive wheat growing areas in the world. Farming will continue to be important there for that area and for the entire nation.

--Southwestern Iowa and north-central Missouri, two of the most erosion-prone sections of the Corn Belt. In these areas two-thirds of the acreage needs attention for erosion control. Annual soil losses are as high as 25 tons per acre.

--The Mississippi Valley Uplands of the Southeast, including southwest Kentucky, west Tennessee and northern Mississippi. These severely erosive soils here are washing away on untreated lands at from 23 to 90 tons per acre.

--The Coastal Plains of the Southeast, including southern Alabama and east central Georgia. Only 29 percent of this cropland is adequately treated.

--The Piedmont area in north central North Carolina and south central Virginia. The average annual erosion rate is 18 tons, a critical rate of soil loss in this area because the soils tend to be shallower than in some of the other erosion-prone areas.

--The northern Mississippi Valley where Wisconsin, Minnesota and Iowa meet. Here the erosion is from 10 to 20 tons annually per acre on sloping land.

What these areas have in common is that they are highly productive farm areas and all have rates of soil erosion that threaten their sustained productivity. Now at last, thanks to the NRI, we know where our soil erosion crisis lies -- it is here, in these pinpointed areas.

The NRI has located other critical areas in the arid West, where irrigation keeps agriculture going, and where farming is especially productive. For these areas, the crisis is not soil erosion but soil salinity and water shortages:

--An especially critical soil salinity area is the Colorado River Basin and the headwaters of the Arkansas River in Colorado. As irrigation continues, the soils become more and more saturated with salts as do the waters that flow off these soils.

--Water is in short supply in all 18 western States that rely on irrigation, but in Idaho, Montana, Oregon, Utah and Wyoming on-farm irrigation efficiency is the lowest, below 40 percent.

--The Ogallala Aquifer supplies ground water to irrigated farms across the High Plains -- Kansas, Nebraska, New Mexico, Texas and Oklahoma. These supplies of water are shrinking from overdrafts, yet irrigation efficiency is only 40 to 69 percent.

In water conservation, then, as well as soil conservation, problems are severe in localized settings, and these are some of the most fertile, productive agricultural areas in the country, the agricultural muscle of this Nation.

Weaknesses In USDA Programs To Deal With Concentrations of Erosion

What, then, were the tools that the Department of Agriculture was bringing to bear on the new surge of soil erosion in prime farming areas caused by intensive cropping? And was the Department equipped to help handle the pinpointed water crises in irrigated farm areas? Frankly, we found these tools not working as well as they should.

The Soil Conservation Service was firmly established in some three thousand soil and water conservation districts as the provider of technical assistance to farmers and ranchers who undertake conservation measures on their land on a voluntary basis. Technical assistance is a $230 million a year program. The SCS must be in the vanguard of addressing the new serious conservation problem on the most affected agricultural lands. However, the very popularity of the SCS technical assistance program in three thousand counties coast-to-coast operates as a political and administrative restraint on the agency's emphasizing assistance in certain areas while deemphasizing it in others.

After the conservation technical assistance program, the largest program within SCS is the small watershed planning and construction program, which has been operating at an annual funding level of about $190 million, which some doubt makes a commensurate contribution to overall conservation needs. Finally, the third major conservation program in USDA is the Agricultural Conservation Program of the ASCS, also funded at $190 million. A recent evaluation of ACP, published in 1981, showed that, of the practices studied, more than 52 percent of ACP's erosion control practices were being installed on lands eroding at annual rates of less than five tons per acre, and soil losses prevented averaged 4 tons per acre.

This evaluation, I should say, has galvanized ACP into action in improving its conservation performances. Gordon Nebeker has been active in this move. The latest evidence we have is that these ACP erosion control practices are now resulting in an average soil saving of 7 tons an acre intead of 4. I bring this old figure up not to reopen any old wounds but simply to cite one example of how the USDA's overall approach in conservation has not stressed accountability to solve the worst problems first.

More Funds Or Better Use Of Existing Funds

As policy makers charged with the responsibility for directing the expenditure of public funds on conservation programs in order to help sustain the agricultural productive capacity of the United States, we are in a political and fiscal dilemma.

The RCA Program we have designed would re-direct existing conservation program efforts for the fiscal years 1983 through 1987. It would assign an increased share of the funds spent by the Department of Agriculture for three top priorities: control of soil erosion on the most productive agricultural lands, water conservation in the arid West, and upstream flood damage reduction in the East. It would target funds for technical and financial assistance on a gradual phased-in basis until, by 1987, 25 percent of all technical assistance and financial assistance would be used in targeted areas from a standpoint of erosion and other top priority conservation problems. Finally, the RCA Program advocates grants to conservation districts, as authorized in the 1981 Farm Bill, as a way of building more local capability and interest in conservation at the local level, so that localities and States can become more active in performing and funding conservation programs.

However, with all these far-reaching reforms in the way existing funds would be spent, the RCA Program does not advocate a significant increase in Federal conservation funds beyond the nearly $1 billion that is currently spent on the total conservation effort. For this, we in the Administration and our RCA proposal have been attacked on Capitol Hill and throughout the conservation community. Many critics believe that the answer is simply more money, and if special needs are to be recognized in certain areas of the country, these areas should be supplied with "new" money. In other words, there should be, our critics say, no plans that would decrease the funding currently available to all parts of the country under the existing untargeted and unprioritized programs.

The Administration has taken stock of the resource situation in this country as presented in the 1980 appraisal done under RCA. This Administration believes that in certain highly productive agricultural areas of the United States, excessive soil erosion is a problem that if not addressed in a concerted way will impair our national agricultural productive capacity. While we believe that soil erosion, water scarcity for agriculture, and upstream flood damages do occur to some degree in all parts of the United States and should receive some level of attention as part of a national conservation program, it is time to place the Federal Government's emphasis on those particular areas of the country where these problems are the most severe to the point that they pose a serious threat to continued high production of agricultural products.

On the matter of erosion, the number on priority, we believe that Dr. Theodore W. Schultz, Nobel Prize winning agricultural economist from the University of Chicago, gave sound advice in his talk last March 17 to the Agricultural Council of America here in Washington.

At that time, Dr. Schultz said:

> "By now it should be evident that soil erosion does not occur in all parts of agriculture. It is not a national phenomenon. .....
>
> "Clearly soil erosion is location specific. Its technical and economic attributes vary widely both within and between locations. For the purpose at hand the unit of land on which it occurs is a farm and the decision entity is the farmer. This being the case, a nationally administered soil conservation that is politically designed to provide funds and services to all part of agriculture, is bound to be a model of inefficiency."

This Administration feels that the conservation programs of the USDA, as popular as they are in the communities they serve and as durable as their support has been in Congress, have been too often "models of inefficiency" in Dr. Schultz's words. We want these programs to continue, but they must become more efficient and thus more responsive to the precise localized nature of the soil erosion threat to American agriculture. The same type of targeting should be applied, as well, to the other major resource priorities identified in the RCA: water conservation in the arid West and upstream flood damages in the East. After the final version of the national program for soil and water conservation is sent by the President to Congress shortly, the Department will set to work implementing the RCA Program. At its heart is going to be the greater attention to the three priorities, especially through geographic targeting.

Can Agricultural Productivity Be Sustained?

When I was invited to speak, the Committee told me they did not want a gloom-and-doom presentation. We still have to answer the question, "Can our agricultural productivity be sustained," given the problems of erosion and water shortages I have mentioned. My answer is that it certainly can. Soil and water supplies are in danger in specific local areas. We know, thanks to our excellent NRI data base, where those areas are and how severe the problems are. So we can and will address them. We also believe the improvements in farm technology -- new seeds, fertilizers, equipment, information resources -- will continue to increase the productivity of agriculture. Finally, farmers remain one of our last stubborn breeds of small-business enterpreneurs. They are people who have shown time and time again that their will to survive is matched only by their skill at applying new technology to their farms. But as Secretary Block has said so often, unless farming is profitable for the individual farm operator, conservation will not be high on the farmer's list of priorities and who can blame the farmer?

With all that we have going for us, I am sure that American agriculture will prevail over the ravages of soil erosion, water shortages and other hazards of productive farming that have arisen on the landscape. It will not be always simple to overcome these threats to the natural resources on which agriculture depends. But in this Administration we intend to put at the service of American farmers and ranchers the most rational, efficient, effective programs that we can devise.

REMARKS BY
CONGRESSMAN GEORGE E. BROWN, JR.

Session 26 - Conservation, Research and Technology

December 1, 1982

I very much appreciate the invitation to appear today at the 1982 Agricultural Outlook Conference, especially to discuss a topic as important as the long-range view for conservation research. However, I am sure that many in attendance today, and certainly the majority of the farmers in the country, have more immediate concerns on their minds. The farm economy is in desperate shape and there are few hopeful signs for the future.

Yet it is even more important than ever not to lose sight of the broader, longer-term issues such as soil and water conservation. We too often neglect these issues in responding to present crises, creating more severe problems in the long run.

Today, the concern of the entire agricultural community has reached a level where concerted action on a wide front appears to be a realistic possibility. Increasing attention to soil and water problems at a time when budgetary pressures are forcing changes in our conservation programs has caused this movement. The time to act has arrived - unfortunately along with $180 billion deficits, a stubborn recession, and a weakened farm economy.

Given fiscal constraints, we must put into use as many cost-effective conservation practices as we can afford. And we need to target the flow of public funds in a way which guides these cost-effective practices onto the most fragile lands and into the areas with the most critical water conservation needs.

It is difficult to target conservation expenditures to regions most in need and to employ conservation practices and systems which deliver the best return. Our past inadequacies in conducting long-range conservation planning are shown by the apparent speed with which conservation issues have jumped onto our current agenda. We are faced with a major problem but do not have adequate data upon which to base policy decisions.

We need to know what soils and aquifers are most critically in need of priority attention so that they can receive <u>more funds</u>. And we must have a solid basis of fact to determine which conservation practices and systems warrant public investments. We also need to administer conservation programs more effectively so that the tons of soil and acre-feet of water conserved per dollar spent starts going up instead of steadily declining.

A start on developing this factual base is contained in the 1982 Natural Resource Inventory. However, this inventory is not currently available for researchers who need the data to determine the state of our current resource base and the rate at which it is declining. The Department of Agriculture should make the effort to make this information available as well as the vast amounts of other infromation contained in USDA data bases.

Obviously we have some very important long-term research needs. Unfortunately, we have not developed an overall plan for agricultural research. I have encouraged the development of such a plan in the latest Farm Bill, which calls for a research needs assessment. Others have addressed this issue as well and deserve our attention.

An excellent start at a discussion of conservation research needs was made at a recent conference, "Soil and Water Research Priorities for the Nation," held in February, 1981, in Madison, Wisconsin. The conference made a number of invaluable recommendations, some of which I would like to share with you.

1) We need to concentrate on sustaining soil productivity through research which refines conservation technologies to deal with diverse conditions. We need to develop practical conservation systems which accomodate the pressures of time and economics which all farmers deal with during a planting season.

2) We need to develop conservation systems which deal with managing water in a stressed environment. As water supplies approach a critical point, competing demands for that water must be dealt with, and these decisions require better data and conservation systems.

3) We need systems which better protect water supplies from contamination from point sources and non-point sources of pollution.

4) We need to develop systems for more effective targetting and delivery of technical and financial conservation assistance.

5) We need to improve assessments of soil and water resources so that we get a clearer picture of what contemporary farm practices are doing to the resource base.

Another excellent report recently issued discusses several of these points as well. The report, "Impacts of Technology on U.S. Cropland and Rangeland Productivity," was prepared by the Congressional Office of Technology Assessment. It presents an excellent overview of the issue, and for individuals interested in trying to formulate long-term conservation research plans, it should be required reading. I would also alert you to an upcoming OTA report on water conservation issues which should also be a top quality document.

Conservation problems are emerging which are beyond our current policies, knowledge base, and even institutions. But with a renewed effort, we can make the corrections needed to address these problems. This will require some changes in the way that we go about our conservation planning.

As I indicated earlier, we need to step up our environmental monitoring efforts. We do not know enough about our current resource base, let alone the rate at which it is being depleted. An effective monitoring system gives us the lead time required when dealing with natural systems, where we need a much longer lead time to implement program changes. More effective monitoring would also provide researchers with the time to deal with a problem once it is detected.

Next, we need to begin to look at agriculture as a system and get away from developing individual technologies to deal with individual problems. Frequently there exist common solutions to seemingly separate problems, but these solutions only become apparent when we look at the larger system. We also need to develop better communication between researchers in different disciplines.

As we examine innovative approaches to solving our conservation problems, we must include emerging technologies in our strategy. Remote sensing can play a large role in future conservation systems by allowing us to monitor our natural resource base on a real-time basis. The House Agriculture Subcommittee which I chair has been exploring the potential of computer and information sciences over the last two years. One major use of these technologies is the maintainence of natural resource data bases required by program planning. Another opportunity exists in the use of these technologies to increase farm efficiency.

But above all, those of us in the policy arena need to rise above the current crises and political pressures which prevent us from doing an adequate job in planning conservation research. We should be willing to spend a little more money today, properly focused, in order to avoid even larger payouts in the future. We should be open in our discussions of policies and not get enmeshed in protecting this agency or that program at the expense of the larger goal.

I am not so naive as to believe that we can do this overnight. But I firmly believe that we need to begin the effort now. We have both the opportunity and the need to do a better job with conservation research.

I want to thank you again for the opportunity to speak today and look forward to further discussions on this topic during the next session of Congress.