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Appendix B

The Statistics of Food Consumption

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The Statistics of Food Consumption

THIS appendix consists of six tables which contain basic data underlying Chapter 4. Table B-1 shows the consumption of all important foodstuffs in original units. Table B-2 gives the factors we have used to convert these foodstuffs into proteins, fats and carbohydrates. Similar factors for the vitamin and mineral content of foods will be found in Table B-3. Table B-4 shows for various foods the deductions we made to take account of inedible refuse. In Table B-5 Pearl's estimates for total calorie consumption are compared with our own. Table B-6 gives the population estimates upon which we based our per capita data.

The consumption estimates in Table B-1 are mostly obtained by correcting output for imports, exports, changes in stocks and nonfood use; see Bureau of Agricultural Economics release "Consumption of Agricultural Products" (1941). In a few cases, as indicated in footnotes, we have made adjustments to these figures, or computed data of our own. The conversion factors in Table B-2 are single-valued, and for calories are based on ratios of 4 calories per gram of protein and carbohydrate, and 9 calories per gram of fat (see p. 153). The factors in this table make partial allowance for the exclusion of inedible portions of foodstuffs shown in Table B-1. The factors for minerals in Table B-3 are also single-valued, but for vitamins we felt it necessary to indicate a range rather than a single figure. For this reason the consumption estimates for vitamins in Table 25 (p. 174) also take the form of a range of values. The percentages by which the crude food consumption data in Table B-3 were subsequently reduced to allow for inedible refuse are shown in Table B-4. These percentages make no allowance for losses of edible food in processing or transportation, in the kitchen or on the table. Except where otherwise stated, all data in this Appendix refer to calendar years.

TABLE B-1

AGGREGATE CONSUMPTION OF INDIVIDUAL FOODS, AVERAGE 1897–1901, AND ANNUALLY 1909–1939

Year	(1) *Wheat*	(2) *Corn* (a) *Dry Milling*	(2) *Corn* (b) *Wet Milling*	(3) *Oatmeal*	(4) *Rice, Milled*	(5) *Rye*	(6) *Sugar, Cane and Beet, Refined*
	mil. bu.	mil. bu.	mil. bu.	mil. lb.	mil. lb.		th. s. t.
1897–1901	407.8	249	8	370	307		2,170
1909	450.7	187	13	442	609		3,423
1910	467.4	185	17	449	683		3,564
1911	463.2	183	17	456	610		3,779
1912	480.0	179	17	480	667		3,696
1913	478.9	177	17	490	768		4,173
1914	489.6	175	12	499	555		3,949
1915	467.7	172	21	507	634		3,963
1916	498.5	168	36	533	908		3,863
1917	490.6	164	38	540	1,024		3,972
1918	402.9	159.9	53.9	546	596		4,071
1919	485.4	90.8	53.4	549	358		4,581
1920	465.0	91.5	54.7	576	555		4,767
1921	447.3	108.7	37.7	587	489		5,224
1922	478.4	103.5	53.6	595	584		5,548
1923	466.9	103.3	52.3	626	594		5,232
1924	474.3	95.3	59.4	617	628		5,916
1925	489.9	91.2	53.8	647	615		6.003
1926	499.7	89.5	65.4	656	670		6,291
1927	497.0	91.1	64.8	686	739		5,768
1928	511.5	95.4	69.6	694	699		6,516
1929	506.7	99.2	68.9	724	646		6,182
1930	502.7	93.1	63.2	709	714		6,039
1931	491.7	88.2	52.5	737	670		6,306
1932	475.2	86.9	49.3	765	762		6,012
1933	464.0	83.9	56.7	642	566		5,870
1934	468.7	81.1	55.7	588	734		6,304
1935	465.5	78.3	43.7	517	688		6,269
1936	486.3	78.8	59.9	517	770		6,203
1937	476.4	77.1	52.8	499	800		5,658
1938	484.2	78.4	56.6	517	754		5,967
1939	485.7	81.8	59.7	517	787		6,671

(7) *Potatoes* mil. bu.	(8) *Sweet-potatoes* mil. bu.	(9) *Beans, Dry Edible* th. bags	(10) *Vegetables, Other* mil. lb.	(11) *Cocoa* mil. lb.	(12) *Fats and Oils, Edible (excl. lard)* mil. lb.	(13) *Apples* mil. lb.
199.3	37.5	2,831	20,833	40.0	480	6,667
326.0	48.4	7,721	23,675	117.7	934	5,802
287.7	49.5	6,376	23,589	110.9	1,109	5,610
266.3	45.3	6,400	23,018	130.0	1,231	6,302
334.3	46.5	6,912	24,938	146.7	1,281	7,250
282.2	45.9	6,457	25,012	149.0	1,374	6,374
299.1	44.4	6,893	25,091	164.0	1,795	6,427
282.1	51.9	6,280	26,207	187.7	1,403	7,256
225.0	50.5	5,758	25,716	232.3	1,746	6,666
330.7	59.7	8,535	26,346	377.2	1,906	6,106
295.9	56.3	8,629	27,238	345.8	2,110	5,790
255.0	64.2	7,314	27,230	365.4	1,927	5,427
302.7	63.2	6,634	30,051	309.5	1,425	5,987
270.4	60.5	5,376	27,518	291.8	1,431	5,275
330.0	64.3	6,313	30,802	331.5	1,445	5,229
307.0	52.4	8,333	28,702	393.8	1,453	6,550
318.1	36.8	8,307	31,053	377.9	1,557	6,023
258.2	41.1	9,469	31,675	362.7	1,997	5,675
277.2	51.9	9,739	32,081	420.5	2,068	6,429
316.7	58.2	9,310	32,220	397.0	2,062	5,711
341.2	48.5	10,092	31,169	348.5	2,081	5,106
287.9	53.3	11,029	33,121	478.7	2,262	5,429
292.6	44.6	12,895	33,837	370.8	2,235	5,097
319.2	54.8	12,412	33,300	419.5	2,021	5,893
311.3	70.9	10,689	33,513	403.3	1,796	5,666
289.0	61.7	10,865	31,661	435.4	1,912	4,751
325.8	63.6	10,870	33,521	439.6	2,182	4,625
318.1	68.2	11,928	36,156	608.6	2,390	5,247
280.6	52.6	11,388	35,779	646.6	2,480	5,104
332.5	61.6	12,810	38,483	513.6	2,740	5,606
311.2	62.9	13,926	40,823	459.3	2,687	5,706
306.1	59.6	12,740	39,693	619.7	2,552	5,350

TABLE B-1—CONSUMPTION OF FOODS (concluded)

Year	(14) *Citrus Fruit* mil. lb.	(15) *Fruit, Other* mil. lb.	(16) *Beef* mil. lb.	(17) *Veal* mil. lb.	(18) *Pork (incl. lard)* mil. lb.	(19) *Lamb and Mutton* mil. lb.
1897–1901	524	5,400	5,133	402	6,410	509
1909	1,658	7,268	6,713	660	7,175	606
1910	1,730	7,296	6,508	667	6,898	595
1911	1,816	7,689	6,426	666	7,601	690
1912	1,714	8,318	6,153	662	7,440	730
1913	1,881	7,795	6,157	608	7,554	701
1914	2,341	8,848	6,143	572	7,525	708
1915	2,308	9,333	5,669	591	7,867	612
1916	2,326	7,904	6,004	656	8,245	595
1917	1,985	8,715	6,687	745	7,170	463
1918	1,837	8,333	7,167	761	7,658	499
1919	2,468	9,309	6,462	824	7,869	598
1920	2,977	9,813	6,294	852	8,069	579
1921	3,095	8,840	6,025	825	8,240	661
1922	3,103	10,545	6,502	858	8,722	564
1923	3,663	10,490	6,671	919	9,927	593
1924	3,879	10,996	6,785	977	10,089	596
1925	3,547	11,213	6,888	993	9,166	605
1926	3,697	12,889	7,074	958	8,972	637
1927	3,859	11,860	6,485	875	9,576	631
1928	4,242	13,286	5,872	782	10,144	664
1929	4,417	12,575	6,048	767	10,055	685
1930	4,662	11,891	6,021	794	9,803	824
1931	5,151	12,968	6,026	823	10,156	886
1932	5,081	10,735	5,830	822	10,613	883
1933	5,009	10,387	6,469	891	10,540	849
1934	5,071	11,427	7,066	1,065	9,755	796
1935	5,362	12,782	6,827	1,023	7,424	884
1936	5,683	12,969	7,551	1,098	8,584	858
1937	5,966	14,949	7,143	1,096	8,566	869
1938	7,325	13,801	7,092	985	9,019	899
1939	8,185	15,412	7,149	961	10,073	872

(20) *Chickens*	(21) *Eggs*	(22) *Milk and Milk Products*			
		(a) *Milk, Whole*	(b) *Milk, Evap. and Condensed*	(c) *Butter*	(d) *Cheese*
mil. lb.	millions	mil. lb.	mil. lb.	mil. lb.	mil. lb.
1,284	19,945	19,312	208	1,501	284
1,775	26,496	23,969	496	1,618	354
1,905	28,329	22,440	536	1,702	405
1,956	30,900	21,932	600	1,754	387
1,897	29,637	26,239	674	1,584	382
1,886	29,483	26,427	774	1,606	427
1,909	29,268	26,293	884	1,686	437
1,929	31,456	25,253	959	1,731	432
1,879	30,506	25,473	982	1,766	410
1,834	29,095	28,649	980	1,633	437
1,865	29,707	33,295	1,077	1,443	402
1,988	31,850	28,056	985	1,608	442
1,945	31,886	33,154	917	1,577	444
1,934	32,520	31,932	1,068	1,757	450
2,079	34,773	32,283	1,197	1,884	472
2,174	36,554	31,556	1,282	1,995	489
2,197	37,001	34,831	1,349	2,053	522
2,287	36,842	37,052	1,353	2,029	537
2,328	39,749	40,487	1,388	2,044	549
2,489	40,715	41,688	1,385	2,065	530
2,423	40,753	43,035	1,472	2,063	535
2,429	40,721	43,802	1,656	2,117	562
2,643	40,787	45,535	1,673	2,134	568
2,425	41,271	46,776	1,665	2,247	555
2,461	39,095	46,228	1,745	2,282	546
2,561	37,253	44,920	1,737	2,254	565
2,364	36,469	43,490	1,895	2,312	613
2,310	35,571	44,191	2,056	2,207	669
2,482	36,968	46,067	2,036	2,135	688
2,409	39,679	47,738	2,155	2,156	712
2,299	40,294	48,290	2,241	2,194	759
2,544	40,978	49,655	2,334	2,323	749

For notes to Table B-1 see following pages.

General Note to Table B-1

Unless otherwise specified, the data presented for the years 1909–39 in Table B-1 are from a Bureau of Agricultural Economics release, "Consumption of Agricultural Products" (1941), hereafter referred to as BAE consumption study, series, or data. Estimates for the period 1897–1901 are our own, based on whatever evidence is available concerning consumption, production, foreign trade, and stocks. Whereas the BAE data refer to calendar years, our own estimates sometimes refer to crop years. Though this may introduce slight incomparabilities from year to year, the effect over any length of time will be negligible, the more so since for only 5 out of a total of 26 series do we use other than calendar-year data. As to coverage, the main item not included is seafood. Production data for fish are poor and extremely scanty, while consumption data are not available at all. Also omitted are such miscellaneous items as tree nuts, peanuts (other than those used for oil), barley (used both as pearl barley and as malt for purposes other than fermented beverages) and buckwheat. Though the quantitative result of these omissions cannot be gauged exactly, it is unlikely that the general trends are in any way affected.

The following notes, numbered in the same manner as the columns to which they refer, give definition, source, and basis of adjustment, if any, of the series. The net output data mentioned will be found in Table A-1 above.

(1) Wheat:

Only wheat used in flour production is included. For 1897–1901, "Statistics of American Wheat Milling and Flour Disposition Since 1879," *Wheat Studies,* Vol. IV (Food Research Institute, Stanford University, Dec. 1927), Appendix Table I, p. 101.

(2) Corn:

According to a communication received from Miss Elna Anderson of the Bureau of Agricultural Economics the corn consumption estimates of that Bureau include products derived in the wet-milling process which are not consumed as food, as well as corn consumed in the manufacture of fermented malt liquors. Furthermore, the composition of dry-milled corn products differs from that of wet-milled products in that the former possesses both protein and fat in addition to the carbohydrate which is the sole constituent of wet-milled products. It was therefore necessary to separate total corn consumption, as reported by the BAE, into dry-milled and wet-milled corn and to exclude from the latter such fractions as are utilized in nonfood industries. This can be accomplished with relatively little difficulty for recent years, but requires various assumptions as we approach the more remote years.

The procedure we finally adopted is as follows:

(I) BAE data converted from pounds into bushels: 56 lbs. = 1 bu.

(II) For crop years (beginning October) 1926–27 to 1939–40 corn going into dry milling is given in *Feed Statistics,* Supplement to the 1941 issues of *The Feed Situation* (U. S. Bureau of Agricultural Economics, 1941), p. 15.

(III) Corn going into wet-milled products is given in *ibid.,* p. 26, for crop years 1917–18 to 1939–40.

(IV) Comparison of (II) + (III) with (I) in such a way as to consider the crop year 1926–27 equivalent to the calendar-year 1927, etc., shows the two series to be very similar until 1933, in which year the calendar-year data exceed the sum of (II) and (III) by 6 to 7 million bushels. According to *ibid.*, Table 21, this amount is accounted for by corn used in the production of fermented malt liquors. The two series, (I) and (II) + (III) respectively, may therefore be considered as equivalent. Consequently corn going into dry milling is estimated as the difference between total corn consumed (I) and corn used in wet milling, the crop year being considered to refer to the second calendar year, i.e., 1917–18 = 1918. For 1918 and 1919 we deduct 7 million bushels from the total as going into beer production.

(V) Our estimates for 1909 to 1917 are based on per capita consumption of cornmeal products as estimated for 1909 in Holbrook Working, "The Decline in Per Capita Consumption of Flour in the United States," *Wheat Studies*, Vol. II (July 1926), p. 279, plus an allowance for the production of hominy and grits, derived from the 1909 Census of Manufactures. The figure thus obtained, and converted to aggregate consumption in terms of bushels of corn, was then linked to the comparable estimate for 1918, derived as described above, by straight-line interpolation. These estimates we deduct from BAE totals (I), the latter being reduced by 7 million bushels each year to adjust for the amount used in beer manufacture. We thus obtain estimates of corn entering the wet-milling process.

(VI) From utilization data of wet-milled products for recent years, such as those given in a mimeographed release of the U. S. Bureau of Agricultural Chemistry and Engineering, May 1940, and in a paper presented at the Program on Grain Marketing, University of Illinois, Jan. 9, 1940, by F. J. Hosking, of the Corn Industries Research Foundation, entitled "Merchandising Corn Products at Home and Abroad," we have estimated that the following fractions are used for food:

	Percent
Starch	33
Sirup	96
Sugar	100
Oil	90

No allowance for corn oil need be made at this point, since it is included in (12) Fats and Oils. For the other three products, it was assumed that 1 bushel (56 lb.) of corn will yield (alternatively) 34.5 lb. of starch, 38.1 lb. of corn sirup, or 36.4 lb. of corn sugar (80 percent reducible sugars). This information is given in *Starches, Dextrines and Related Products*, Report 138, Second Series (U. S. Tariff Commission, 1940?), p. 37. According to the above-mentioned release of the Bureau of Agricultural Engineering and Chemistry, average sales for 1928–37 were as follows: starch, 722 mil. lb.; sirup, 1,010 mil. lb.; sugar, 697 mil. lb. Combining all these data, we concluded that about 21 percent of all corn utilized in the wet-milling industry is used for non-food purposes. Accordingly, we reduced our estimates for wet-milled corn (V) by 21 percent each year. The rough nature of the above estimates is obvious.

Footnotes to Table B-1 continued on next page.

Footnotes to Table B-1, continued.

(VII) The estimate of dry-milled corn for 1897–1901 represents production of cornmeal and hominy as given in the 1899 Census of Manufactures; that of wet-milled corn is based on the trend shown by the data of the succeeding decade.

(3) Oatmeal:

Estimates for crop years from 1909–10 to 1932–33 are based on per capita consumption as given by N. L. Gold, *Agricultural Land Requirements and Available Resources,* Part III of the Supplementary Report of the Land Planning Committee of the National Resources Board (Washington, 1935), p. 5. Oats were converted into oatmeal by a factor of 1 bu. oats = 18 lb. meal. For 1933–39, calendar-year data are available in a release on "The National Food Situation" (U. S. Bureau of Agricultural Economics, Dec. 1941), Table 7. The two series were joined without adjustment, and it was also assumed that all oats for human consumption are used as oatmeal; this assumption probably does not involve a major error. Per capita consumption in 1897–1901 was estimated to have been equal to that of 1909–10 to 1911–12.

(4) Rice:

Estimates for crop years 1909–10 to 1917–18 from Gold, *op. cit.;* see note (3). Beginning in 1918–19, official estimates are available (*Agricultural Statistics, 1940,* Table 122). Consumption in 1939–40 was assumed to have been the same as that of the preceding year. The 1897–1901 estimate refers to 1899 only and is taken from *Apparent Per Capita Consumption of Principal Foodstuffs in the United States,* Domestic Commerce Series No. 38 (U. S. Department of Commerce, 1930), p. 10.

(5) Rye:

Annual consumption data are not available except for Census years (*ibid.,* p. 12). These figures indicate that aggregate consumption has not changed appreciably over the period under investigation; see also "Rye in its Relations to Wheat," *Wheat Studies,* Vol. IV (March 1928), pp. 196-98. We therefore estimated consumption for the entire period at 307 million lb. per annum.

(6) Sugar:

Refined sugar available for human consumption. For 1897–1921: *Agr. Stat., 1940,* Table 197; 1 ton raw sugar was assumed to equal .9369 tons refined sugar. For 1922–37: *Agr. Stat., 1939,* Table 181; for 1938: *Agr. Stat., 1940,* Table 197; for 1939: *Agr. Stat., 1941,* Table 206. Raw sugar for the last two years was converted into refined sugar on the basis of the two per capita consumption figures given in adjoining columns of the same tables.

(7) Potatoes:

Since BAE consumption data are not adjusted for seed use of potatoes, we used our estimates of net output for crop years, adjusted for exports and imports. Potatoes used in starch manufacture cannot be excluded, but in the light of Census data on starch manufacture they appear to account for less than 1 percent of total output.

(8) Sweetpotatoes:

BAE data run consistently higher than our net output estimates, suggesting that they represent gross output. Consequently, we substituted our net

output estimates, on a crop-year basis. No adjustments for stock changes or foreign trade were made.

(9) Beans, dry edible:
Estimate for 1897–1901 is based on our net output data for crop years, unadjusted for stock changes or foreign trade.

(10) Vegetables, other:
BAE consumption data for all vegetables minus output of potatoes, sweetpotatoes, and dry edible beans. Since canned vegetables are given in terms of their fresh equivalent, this presentation overstates the total poundage to some extent. However, calorie values of canned vegetables seem to run slightly higher than those of fresh vegetables (see *Canned Food Reference Manual,* American Can Company, New York, 1939) so that the net overstatement, in terms of nutrients, is likely to be small. An alternative method would have been to use per capita consumption data as supplied annually in *Agricultural Statistics.* However, the coverage of those data is far less satisfactory, and no data are available prior to 1919. The figure for 1897–1901 represents an arbitrary estimate.

(11) Cocoa:
The 1897–1901 figure represents the best estimate that may be derived from import figures for the years in question.

(12) Fats and Oils, edible, excluding lard:
The 1897–1901 figure represents an estimate based upon average cottonseed oil disappearance during the years 1897–1901, as given in *Fats, Oils and Oleaginous Raw Materials,* Statistical Bulletin 59 (U. S. Department of Agriculture, 1937), Table 38. The basis for this procedure lies in the similarity of the data for oil and fat consumption and cottonseed oil disappearance during the years 1909–13.

(13) Apples, fresh:
For 1897–1901 we used our net output estimates, reduced by 1 billion pounds each year to adjust for fruit going into drying, canning and export.

(14) Fruit, citrus:
For 1897–1901 we used our output estimates, adjusting roughly for imports and exports.

(15) Fruit, other:
BAE consumption data for all fruit, reduced by apples and citrus fruit. This includes the fresh-fruit equivalent of canned and dried fruit, and fruit juices. The effect may be to overstate somewhat the absolute amounts. The estimate for 1897–1901 was based on such fruit production and import figures as were available, roughly adjusted to the 1909 coverage. The resulting figure is not significant in itself, but probably introduces only a minor error into aggregate food consumption.

(16)-(19) Beef, Veal, Pork (incl. lard), Mutton and Lamb:
Data are for dressed weight, from *Livestock, Meats, and Wool Market Statistics and Related Data, 1940* (U. S. Agricultural Marketing Service, 1941), p. 100. The figure for 1897–1901 is a 3-year average of 1899–1901 only.

Footnotes to Table B-1 continued on next page.

Footnotes to Table B-1, concluded.

(20) Chickens (dressed weight):

For 1897–1901 we used our net output estimates adjusted to the level of the BAE consumption series by the average relationship existing between the two series in 1909–14.

(21) Eggs:

Revised BAE consumption data were used from 1909 on; see *The Poultry and Egg Situation* (U. S. Bureau of Agricultural Economics, April 1942), p. 13. For 1897–1901 we used our own net output data, allowing a 10 percent increase for off-farm production.

(22) Milk and Milk Products:

Since the composition of milk varies according to utilization, we are here presenting more detailed data than we do in the case of production. Though a still finer breakdown is possible, little increased accuracy would result, because of the relatively small amounts of the several manufactured dairy products.

(a) Milk, whole:

Our estimates for output of fluid milk, Table A-4 above, reduced by milk-equivalents of cheese production (1 lb. cheese = 10 lb. milk) and evaporated milk production (1 lb. evaporated milk = 2.2 lb. milk). For source of evaporated milk and cheese data see (b) and (d).

(b) Milk, evaporated:

For 1909–1938: E. E. Vial, *Production and Consumption of Manufactured Dairy Products,* Technical Bulletin 722 (U. S. Department of Agriculture, 1940).

For 1939: Based on *Dairy Situation,* BAE, Feb. 21, 1940.

For 1897–1901: Based on data for 1899, 1900, 1901 and estimated data for 1897–98.

(c) Butter:

Sources same as (b).

(d) Cheese:

Sources same as (b).

TABLE B-2

COMPOSITION OF FOODS

Food	Unit	Protein	Fat	Carbohydrate	Source
		to convert into short tons multiply by			
Wheat	Mil. bu.	2,377	208	15,659	Atwater[a]
Corn, dry	" "	1,518	314	12,441	[b]
Corn, wet	" "	..	..	15,910	[c]
Oatmeal	" lb.	80.5	36	338	Atwater
Rice, milled	" "	40	1.5	395	"
Rye	" "	34	4.5	394	"
Sugar, refined	Th. s. t.	..	..	1,000	Pearl
Potatoes	Mil. bu.	510	30	4,800	U.S.D.A., Circ. 146
Sweetpotatoes	" "	412	165	6,628	" " " " " "
Beans, dry edible	Th. bags	1.4	.15	2.85	" " " " " "
Vegetables, other	Mil. lb.	5.75	1.2	24.45	[d]
Cocoa	" "	108	145	189	Atwater
Fats and oils	" "	..	490	..	Pearl
Apples	" "	1.5	2.0	65.0	U.S.D.A., Circ. 50
Citrus fruit	" "	.3	.05	3.8	[e]
Fruit, other	" "	4	2	66	[f]
Beef	" "	76	77	..	Pearl
Veal	" "	78	31	..	"
Pork	" "	41	274	..	"
Mutton and lamb	" "	65	120	..	"
Chickens	" "	67	46	..	"
Eggs	Millions	8.17	5.83	..	"
Milk, whole	Mil. lb.	16.5	20	25	Atwater
Milk, evap.	" "	48	46	56	"
Butter	" "	5	425	..	"
Cheese	" "	148	192	..	"

General Note to Table B-2

All factors refer to the food *as purchased* and thus make partial allowance for inedible portions, but not for waste. To convert to calories, use these factors: 1 short ton = 2,000 lb.; 1 lb. = 453.6 grams; each gram of protein or carbohydrate yields 4 calories; each gram of fat yields 9 calories.

Sources: Raymond Pearl, *The Nation's Food* (W. B. Saunders, Philadelphia, 1920); W. O. Atwater and A. P. Bryant, *The Chemical Composition of American Food Materials,* Experiment Station Bulletin 28 (U. S. Department of Agriculture, 1896; reprinted 1906); Charlotte Chatfield and L. I. McLaughlin, *Proximate Composition of Fresh Fruits,* Circular 50 (U. S. Depart-

ment of Agriculture, 1928); Charlotte Chatfield and Georgian Adams, *Proximate Composition of Fresh Vegetables,* Circular 146 (U. S. Department of Agriculture, 1931).

[a] We rejected Pearl's factors and went back to Atwater's original tables because it appears from Pearl's data that he converted bushels of wheat into barrels of flour on the basis of 4.5 bu. = 1 bbl. This conversion factor is appropriate for 1918 and 1919, but too low for all other years. The factors we used are taken from the table of official conversion factors given in *Agricultural Statistics, 1940,* p. 8, footnote 30.

[b] These factors are derived from Atwater's composition of "cornmeal, granular," on the assumption that 1 bu. of corn = 33 lb. of cornmeal.

[c] The factor is a weighted average of the carbohydrate content of starch, sugar and sirup, as given by Pearl for the first two items; sirup was assumed to be equivalent to sugar. The weighted content is 86 percent. Similarly, a weighted average conversion factor was computed to convert pounds of starch, sugar and sirup into bushels of corn. This factor is 37 lb. Consequently, 1 million bushels of corn will yield 15,910 short tons of carbohydrate. Corn oil is included under fats and oils.

[d] The factors are weighted averages; the individual factors, taken from Circular 146, have been weighted by their estimated relative consumption in 1929.

[e] The factors are weighted averages; the individual factors, taken from Circular 50, have been weighted by their estimated relative consumption, averaged over the period 1909–37. Differences in weight per box as between California and Florida were taken into account.

[f] The factors are weighted averages; the individual factors, taken from Circular 50, have been weighted by their estimated average relative consumption during the entire period.

TABLE B-3

AVERAGE PER CAPITA CONSUMPTION, 1935-39, AND VITAMIN AND MINERAL CONTENT OF INDIVIDUAL FOODS

Food	*Average Annual Consumption, 1935–39* (100 grams)	*Vitamin A* (international units per 100 grams)	*Vitamin B_1 (thiamin)* (micrograms per 100 grams)	*Vitamin B_2 (riboflavin)* (micrograms per 100 grams)	*Calcium* (percent)	*Phosphorus* (percent)	*Iron* (percent)
Cereals							
Flour, wheat, white[a]	700.3		4– 33	40	.015	.101	.0013
Flour, wheat, whole[a]	14.3		110–167	100–200	.035	.300	.0040
Flour, rye	11.4		55– 73	60	.018	.278	.0013
Cornmeal[b]	45.9		17–100	80	.016	.152	.0009
Oatmeal	18.2		60–257	100–200	.081	.365	.0052
Rice	27.5		10– 13		.009	.092	.0007
Dairy products[c]							
Milk, whole	1,655.6	160– 252	13– 22	195–240	.118	.093	.0002
Milk, evaporated[d]	67.2	300– 775	17– 27	330	.236	.186	.0004
Butter	77.1	1,000–8,500			.016	.016	.0002
Cheese	24.5	1,200–4,000	13– 17	450–600	.873	.610	.0010
Eggs[h]	170.1[e]	1,000–4,500	25– 60	280–420	.058	.224	.0031
Meat, lean[f]							
Beef	143.1	10– 105	25–100	180–260	.013	.204	.0030
Veal	20.7	10– 105	25–100	180–260	.012	.221	.0024
Mutton and lamb	13.8		67–100	280	.015	.208	.0030
Pork	92.0		25–300	200	.010	.215	.0020
Chicken	84.4		30–150	100–200	.016	.218	.0019
Turkey	11.9				.023	.320	.0038

TABLE B-3—(continued)

Food	Average Annual Consumption, 1935–39 (100 grams)	Vitamin A (international units per 100 grams)	Vitamin B_1 (thiamin) (international units per 100 grams)	Vitamin B_2 (riboflavin) (micrograms per 100 grams)	Calcium (percent)	Phosphorus (percent)	Iron (percent)
Meat, organs[g]							
Liver	9.1	5,000–10,000	100–140	1,800–2,600	.008	.373	.0121
Kidney	3.3	500– 1,000	133–167	1,700–2,200	.016	.287	.0065
Fruit, fresh[h]							
Apples	185.5	40– 100	5– 40		.007	.011	.0003
Apricots	1.4	3,000– 8,000	8– 15	105	.015	.024	.0005
Bananas	92.5	160– 400	15– 60	45– 80	.008	.028	.0006
Cherries	6.4	35– 1,150	17		.017	.022	.0005
Cranberries	2.3	10– 28			.014	.011	.0006
Figs	.9	60– 90	12– 33	82	.050	.035	.0007
Grapes	95.3	15– 90	10– 20		.017	.021	.0006
Grapefruit	50.8	21	10– 33	20–100	.017	.018	.0003
Lemons	21.3		10– 30		.021	.012	.0003
Oranges	147.4	50– 400	10– 48	28– 90	.025	.019	.0003
Peaches	50.8	250– 2,800	7– 23	45	.009	.018	.0003
Pears	26.8	8– 125	10– 32	20–150	.013	.016	.0003
Pineapple	4.5	40– 200	25– 42	50– 80	.016	.011	.0003
Plums and prunes	4.5	200	16– 67		.017	.020	.0005
Strawberries	14.1	60– 90	5		.022	.022	.0009

TABLE B-3—(continued)

Food	Average Annual Consumption, 1935–39 (100 grams)	Vitamin A (international units per 100 grams)	Vitamin B_1 (thiamin) (micrograms per 100 grams)	Vitamin B_2 (riboflavin) (micrograms per 100 grams)	Calcium (percent)	Phosphorus (percent)	Iron (percent)
Fruit, dried[h]							
Apricots	1.0	6,000–15,000	20– 40	240–300	.071	.113	.0076
Currants	.2				.075	.138	.0027
Dates	2.0	60– 300	10– 33		.072	.060	.0021
Figs	2.0	50– 100	25–100	85–125	.223	.104	.0031
Peaches	1.4	1,500– 6,300	10– 15	150–250	.025	.050	.0009
Prunes	9.6	400– 3,500	58– 90	50–650	.062	.093	.0035
Raisins	10.5	10– 100	0– 67	125	.055	.110	.0030
Fruit, canned[i]							
Applesauce	5.1	40– 100	5– 40				
Apricots	4.2	3,000– 8,000	8– 15	105	.015	.024	.0005
Cherries	3.5	35– 1,150	15				
Grapefruit	10.8	21	10– 30	20–100	.017	.018	.0003
Peaches	15.6	250– 2,800	7– 23	45	.009	.018	.0003
Pears	5.5	8– 125	10				
Pineapple	18.1	20– 60	21	20– 30	.016	.011	.0003
Plums	2.7	200	16– 67				
Vegetables, fresh[h]							
Asparagus	9.1	300– 980	45–135		.021	.052	.0012
Beans, dry edible	44.0	400	52–160	250	.031	.112	.0023
Beans, snap	31.8	600– 1,800	18– 32	65–150	.065	.044	.0011
Beets	12.2		5– 70	70–120	.026	.039	.0009
Cabbage	117.9	30– 90	20– 80	65–135	.045	.028	.0004

TABLE B-3—(concluded)

Food	Average Annual Consumption, 1935–39 (100 grams)	Vitamin A (international units per 100 grams)	Vitamin B_1 (thiamin) (micrograms per 100 grams)	Vitamin B_2 (riboflavin) (micrograms per 100 grams)	Calcium (percent)	Phosphorus (percent)	Iron (percent)
Vegetables, fresh (cont.)[h]							
Carrots	39.5	1,800– 7,700	20– 60	75–125	.042	.040	.0007
Cauliflower	12.7	35– 70	43–110	150–220	.025	.065	.0009
Celery	44.0	5– 50	7– 17	30– 55	.072	.046	.0007
Corn, sweet	39.9		40– 50		.009	.120	.0005
Lettuce	63.1	70– 700	10– 90	100–240	.054	.031	.0011
Onions	75.3	40	8– 40	28– 62	.032	.044	.0005
Peas	7.7	500– 3,000	25–165	200–250	.022	.122	.0019
Potatoes	581.1	30– 50	10– 55	40– 80	.013	.053	.0011
Spinach	15.0	13,000–35,000	20– 70	250–400		.048	.0034
Sweetpotatoes	104.8	1,000– 7,000	10– 45	80–100	.033	.052	.0008
Tomatoes	79.4	550– 2,100	10– 40	37– 63	.011	.027	.0006
Vegetables, canned[i]							
Asparagus	2.3	300– 980	50– 60				
Beans, snap	9.1	600– 1,800	11	65–150	.065	.044	.0011
Beets	2.9		8– 32	70–120	.026	.039	.0009
Corn, sweet	19.3		33				
Peas	22.2	80–200	67–100	200–250	.022	.122	.0019
Spinach	4.1	4,000–10,000	6				
Tomatoes	25.9	4,000	33	37– 63	.011	.027	.0006
Tomato juice	16.1	825	23– 38				
Pumpkin	2.1	84					
Cocoa	20.0				.112	.709	.0027

Source: For all items, except where otherwise noted, the source is that given for the identical item in the notes to Table B-1. Consumption for all fruit and vegetables is taken from *Agricultural Statistics, 1941,* Tables 378-82.

The following publications served as sources from which the range of vitamin contents was established:

E. V. McCollum, Elsa Orent-Keiles, and H. G. Day, *The Newer Knowledge of Nutrition* (5th ed.; Macmillan, 1939).

H. C. Sherman, *Chemistry of Food and Nutrition* (6th ed.; Macmillan, 1941).

M. A. B. Fixsen and M. H. Roscoe, "Tables of the Vitamin Content of Human and Animal Foods," *Nutrition Abstracts and Reviews,* Vol. 7 (Aberdeen University Press, April 1938), pp. 823-67.

For calcium, phosphorus and iron the source was Sherman, *op. cit.,* pp. 562-65.

Coverage: Though coverage is not complete, the omissions—caused by lack of data—do not seriously impair the significance of our findings, since none of the omitted items is consumed in quantities that could be termed large relative to the items covered. Fish is probably the most important omission. However, since its contribution is largely confined to vitamin A, consumption of which appears most satisfactory in any case, and vitamin D, consumption of which we have not attempted to estimate, the omission, even if it were quantitatively important, leaves our conclusions unaffected. Another food—peanuts—contributes to B_1 and B_2 consumption, it is true, but although peanuts rank high in content per unit of weight, aggregate consumption does not appear to result in daily per capita consumption of more than 9 units of B_1 and between 10 and 20 micrograms of B_2.

Contributions from tree nuts and a number of green vegetables are smaller than those mentioned above, even though contents per unit of weight are high.

Blanks do not necessarily denote absence of vitamin content, but may also signify that the value has not thus far been established experimentally. Since it is often impossible from the published material to say which situation prevails, we have made no attempt to indicate reasons for omitting entries.

[a] No data are available on relative consumption of white and whole wheat flour. Total wheat flour consumption was therefore roughly apportioned between the two on the basis of flour production as reported in the Census of Manufactures, 1935, 1937 and 1939.

[b] Based on data for dry-process products as given in *Feed Statistics,* Supplement to the 1941 issues of *The Feed Situation* (U. S. Bureau of Agricultural Economics), p. 15.

[c] Data are for 4-year average 1935–38, as given in *The Dairy Situation,* BAE, Feb. 21, 1940. Data for 1939 have since become available (*Agr. Stat.,* 1941, Table 588). Their inclusion would raise butter consumption by 0.7 percent; cheese by 3.7 percent; evaporated milk by 1.9 percent.

[d] Case goods, unskimmed.

[e] One egg = 2 oz., or 56.7 grams.

[f] The only type of meat for which the authors were able to locate sufficient

Footnotes to Table B-3 continued on next page.

data to enable them to determine approximately the percentage of lean meat was beef. This was set at 57 percent, on the basis of data in W. H. Tomhave, *Meats and Meat Products* (Lippincott, 1925) and L. D. Hall and A. D. Emmett, *Relative Economy, Composition and Nutritive Value of the Various Cuts of Beef,* Bulletin 158 (Illinois Agricultural Experiment Station, 1912). The same percentage was used for veal, while for mutton and lamb 40 percent and for hogs 30 percent were assumed to be lean meat. These percentages were applied to meat consumption for 1935–39. No deductions were made for fat or waste material in the case of chicken and turkey, and this undoubtedly results in an overstatement.

[g] Both liver and kidney consumption were determined separately for each of the four types of animal, and then aggregated. The estimates were based on scattered data pertaining to average weight of the organ and average dressed weight of the whole carcass, yielding percentages of dressed weight represented by each organ. These percentages are:

	Beef	*Veal*	*Mutton and Lamb*	*Pork*
Liver	1.0	2.0	4.0	1.5
Kidney	.5	1.0	.5	.5

The sources are:

(1) P. I. Aldrich, *The Packers' Encyclopedia* (The National Provisioner, Chicago, 1922).

(2) Arnold C. Schueren, *Meat Retailing* (Vaughan, Chicago, 1927).

(3) A written communication from Miss Elna Anderson of the Bureau of Agricultural Economics based in turn on data provided by the Division of Livestock, Meats, and Wool of the Agricultural Marketing Service.

There is no doubt that some portion of this meat is not designed for human consumption, since considerable portions of it go into animal feed. The degree of overstatement is unknown. The vitamin values are based on Sherman only.

[h] Consumption data include inedible refuse. Correction for this is made, in accordance with Table B-4, in the final values.

[i] For those of the canned goods for which no specific data are available, vitamin and mineral content was assumed to equal that of the fresh fruit or vegetable. No refuse factors were applied to the quantities listed under average annual consumption.

TABLE B-4

PERCENTAGE OF INEDIBLE REFUSE IN SPECIFIED FOODS

Food	*Percent*
Vegetables	
Beans, lima	55
Beans, snap	7
Beets	20
Cabbage	15
Carrots	20
Celery	20
Lettuce	15
Onions	10
Peas	45
Potatoes	20
Sweetpotatoes	20
Fruits	
Apples	25
Apricots	6
Bananas	35
Cherries	5
Grapefruit	30[a]
Grapes	25
Lemons	30
Oranges	27
Peaches	18
Pears	10
Plums	5
Prunes	6
Strawberries	5
Dates	10
Prunes, dried	15
Raisins	10
Other	
Eggs	11

Source: Atwater and Bryant, *op. cit.*
[a] Estimated.

TABLE B-5

COMPARISON OF PEARL'S ESTIMATES WITH THOSE OF THE NATIONAL BUREAU FOR ANNUAL CALORIE CONSUMPTION IN THE UNITED STATES, 1911–16[a]

Billion calories

Groups	*Pearl*	*NBER*
Grains	45,057	45,192
Meats	28,104	25,048
Dairy products	19,834	15,299
Sugars	17,197	14,166
Oils and nuts[d]	6,812[b]	6,268[c]
Fruit and vegetables[e]	9,773	13,869
Poultry and eggs	2,620	3,311
Fish	535	..
TOTAL	129,931	123,153

[a] Raymond Pearl, *op. cit.*, p. 229; average for fiscal years July of year shown to June of year following. NBER data, average for calendar years shown.
[b] Includes oleomargarine.
[c] Excludes peanuts.
[d] Includes cocoa.
[e] Coverage differs considerably.

General Note to Table B-5

As mentioned in the text of Chapter 4, two previous investigations were made in this field, one by Raymond Pearl (1920, referred to above) and one by Holbrook Working[1] who extended Pearl's estimates (in less detailed form) through 1924–25. Though we have relied heavily upon Pearl's work as far as conversion factors are concerned, the consumption data at our disposal represent great improvements over those available twenty years ago. A first glance at Table B-5 suggests that the use of a different set of consumption figures, and slightly lower calorie values, has had little effect on the results. This, however, is true only with regard to the total, and is attributable to the fact that large differences in the estimates for individual items tend to cancel one another in the aggregate.

A group-by-group comparison for the average of the six years 1911–12 to 1916–17[2] reveals that our estimates exceed Pearl's for fruits and vegetables, and eggs and poultry, whereas for meats, sugar, oils and dairy products, Pearl's estimates exceed ours. For cereals the two estimates are practically identical. In the grand total the excess of Pearl's estimate over our own amounts to about 5½ percent.

Working's continuation of, and improvement upon, Pearl's work is notable for the fact that although written at a time when current statistics suggested that the tendencies at work up to 1921 had apparently approached and even passed a turning point, it nonetheless forecast a further decrease in per capita food consumption, a forecast fully borne out during recent years. Another tentative suggestion made by Working, namely that sugar consumption would expand further at the cost of flour, has not been realized.

[1] "The Decline in Per Capita Consumption of Flour in the United States," *Wheat Studies*, Vol. II (July 1926).

[2] Since Pearl's data refer to a greater degree to crop years than do ours, we prefer to use a 6-year average that will render the two sets more comparable by partially obliterating the differences due to this fact.

TABLE B-6

POPULATION ESTIMATES, 1897–1941[a]

Year	Midyear Estimates A	B	C	D	Index (1929:100)
		(thousands)			
1897	72,189	..	..	..	59.2
1898	73,494	..	..	..	60.2
1899	74,799	..	..	..	61.3
1900	76,129	76,110	..	..	62.4
1901	..	77,273	..	..	63.4
1902	..	78,601	..	..	64.5
1903	..	80,143	..	..	65.7
1904	..	81,493	..	..	66.8
1905	..	83,150	..	..	68.2
1906	..	85,041	..	..	69.7
1907	..	87,198	..	..	71.5
1908	..	88,587	..	..	72.6
1909	..	90,508	..	..	74.2
1910	..	92,422	92,331	..	75.8
1911	..	..	93,812	..	77.0
1912	..	..	95,290	..	78.2
1913	..	..	97,198	..	79.8
1914	..	..	99,102	..	81.3
1915	..	..	100,579	..	82.6
1916	..	..	102,021	..	83.7
1917	..	..	103,467	..	84.9
1918	..	..	104,595	..	85.9
1919	..	..	105,159	..	86.3
1920	..	..	106,641	..	87.5
1921	..	..	108,716	..	89.2
1922	..	..	110,229	..	90.5
1923	..	..	112,109	..	92.0
1924	..	..	114,250	..	93.8
1925	..	..	115,953	..	95.2
1926	..	..	117,507	..	96.5
1927	..	..	119,125	..	97.8
1928	..	..	120,557	..	99.0
1929	..	..	121,832	..	100.0

TABLE B-6 (concluded)

Year	Midyear Estimates A	B	C	D	Index (1929:100)
			(Thousands)		
1930	..	..	123,091	123,077	101.0
1931	..	..	..	124,039	101.8
1932	..	..	..	124,840	102.5
1933	..	..	..	125,578	103.1
1934	..	..	..	126,373	103.7
1935	..	..	..	127,249	104.5
1936	..	..	..	128,052	105.1
1937	..	..	..	128,823	105.8
1938	..	..	..	129,823	106.6
1939	..	..	..	130,878	107.4
1940	..	..	..	131,956	108.3
1941	..	..	..	133,039	109.2

(A): *Statistical Abstract of the United States.*
(B): National Bureau, unpublished.
(C): BAE, "Consumption of Agricultural Products," March 1941.
(D): Bureau of the Census releases, March 15, 1941, and June 11, 1942.

[a] The figures in this table represent the best population estimates we were able to assemble, and were used in computing per capita consumption data for various foods. Figures apply to the continental United States.