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Determinants of Recent Trends in Food Consumption
With Implications for Nutrition

by

David M. Smallwood*

Food Consumption

* Paper prepared for presentation at the AAEA Annual Meetings in Knoxville, TN, July 31-Aug 2, 1988. The views expressed herein are those of the author and not necessarily those of ERS or USDA.

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David M. Smallwood*¹

The mix of foods we eat continues to change. This change has created a need to monitor and assess those factors influencing food consumption and its implications for human nutrition and health. Marked changes have occurred over the last 25 years. In addition, national averages mask the diversity in consumption across households of different socioeconomic and demographic groups.

The economic impact on food consumption decisions of food prices and income has been the object of study by agricultural economists for many years. The role and significance of these factors in consumption decisions is well known among economists. Noneconomists often have a differing view. Over the last several decades, economists have extended the realm of their models and are finding that many new factors are important in determining the mix of foods that we eat. During the mid 1960's, demand theory was greatly expanded with the emergence of models that viewed retail commodities as intermediate goods demanded by the household, not for themselves, but as inputs into the household production function that produced final goods, such as, nutritious and "Tasty" meals that yield satisfaction more directly.

In the household production model, the consumer combines purchased goods, such as steak and potatoes with household resources like the homemaker's time,

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skill and knowledge in meal preparation, and kitchen facilities to make a meal. The household production framework brought many factors into demand analyses that were once considered outside the model. These new models are able to explain behavior that was once attributed to "tastes and preferences." These factors include the value of time and the influence of women's labor force participation on convenience food and food away from home, the influence of new kitchen technology like microwave ovens, and the role of product attributes such as nutrient content on consumer demand for retail foods.

To better understand the level and amounts of nutrients that individuals receive in their diets, we need to understand their food purchase behavior. Many factors influence the foods that we buy. These include technological advances such as freezing, microwave ovens, aseptic packaging, and embodied convenience; Increasing value of time and changing lifestyles. Each year, the number of households where both the mother and father work is increasing. Competing demands for the homemakers time are forcing households to change their food buying and preparation behavior.

Growing consumer affluence is affecting food purchase behavior. Per capita disposable income in constant dollars has increase over 36% since 1970. This is providing consumers with the ability to buy more quality, variety, convenience, and away from home food. As household affluence increases over time, the share of personal consumption expenditures allocated to food has declined and the share of food expenditures allocated to away from home sources has increased. In 1970, 13.6% of PCE was allocated to food (Manchester series). This share declined to 12.2 percent in 1987. During this same time, the percent of total food expenditure allocated to food away

from home increase from 26.0% to 36.7%. Growing affluence and smaller relative food budgets imply that "economizing behavior" will play a smaller role in future food purchase behavior than in the past.

Consumers are buying more convenience foods and value added items (Chart 1). Chart 1 shows the farm value and the retail value of foods over the last 20 years. Farm values have risen slowly compared with marketing services.

Health concerns are also influencing food choices. For example, egg consumption has dropped steadily ever since eggs were linked to cholesterol and heart disease. This has occurred despite declines in egg prices relative to other foods. On the other hand, fat consumption is rising and now comprises approximately 42% of total caloric intake.

Advertising, particularly of health related attributes, is another factor influencing food choice. For example, advertising of calcium in dairy products and fiber in cereals. The evidence is mounting that consumers are responding to new information on health and nutrition concerns. Whether consumers are getting the right message and balance of information remains a research question. I will say more on this point later.

Economists know little about nutrition, but they have a rich tradition of studying and analyzing consumption behavior, particularly food consumption. Recent trends and economic factors affecting consumption and their implication for nutrition are the topics of this presentation.

Recent Trends in the Mix of Food Consumption

The mix of foods we eat has changed dramatically since 1970 (Table 1). Consumption of some commodities has increased while others have decreased. The most pronounced changes have occurred for individual products. Consumption levels of aggregated product groups has remained more stable. This is somewhat comforting to nutritionists because nutrient composition is more homogeneous within these groups than between groups and subsequently these changes have not created wide fluctuations in nutrient consumption. These changes are also comforting to economists because our theory suggests that consumer responses to economic stimuli should be greatest among closely related goods rather than unrelated goods.

Meat, Poultry, Fish, and Eggs. Between 1970-74 and 1985-86, per capita consumption in the meat protein group, comprised of red meat, poultry, fish and eggs, increased approximately 3% from 261 pounds to 269 pounds. Within this group, marked changes have occurred. Red meat and egg consumption have declined 6% and 16%, respectively. More than offsetting those declines, fish and poultry consumption have increased 21% and 44%, respectively.

A contributed paper presented at last year's AAEA Summer Meetings by Dan Putler linked much of the decline in egg consumption to the spread of information linking eggs with cholesterol and cholesterol with heart disease. In classical demand theory, this change would have been attributed to a change in tastes and preferences. Unfortunately, economists have no model to explain changes in tastes and preferences. Today, Putler's finding is easily incorporated within the conceptual framework of household production and the demand for nutritious meals, health, and other attributes.

The shift from red meats to poultry can be largely explained by changes in the relative prices of the two commodities. During this period, poultry prices fell relative to red meats due, in part, to innovations in poultry production and processing. Relative poultry prices fell to their lowest point during the 1979-83 period when they were approximately 15% lower than in 1970. Since then, poultry prices have increased relative to beef but still remain about 5% below relative prices observed in the 1970-74 period.

Table 2 shows a clear relationship between real food prices of an item and meat, poultry and fish consumption. The first column contains the average consumption of these items during the 1970-74 period. The next three columns show the change in consumption (measured in pounds) from the preceding period. Finally, the last three columns contain the change in real prices from the preceding period. In virtually every instance, a decline in the item price is associated with a corresponding increase in consumption of that item and a rise in the price is associated with a decline in consumption. The major exception is fish where we find that both real prices and consumption have increased. This can be partially explained by rises in consumer income and the fact that fish consumption is rather small and insignificant component of this group compared to the other items and consumption has changed very little on a poundage basis. In addition to price effects over this period, major marketing changes were taking place in poultry products (Chart 2). Products that were once primarily sold as whole birds, were finding increasing shares of production directed into cut-up and processed markets. New products were being developed from new technologies. Fastfood establishments, once dominated by beef entrees, found the new chicken products an economically

attractive addition to their limited menus. In addition, homemakers faced with increasing demands on their time were seeking value added convenience items and processed poultry products were there at the right time.

Rising consumer concerns about cholesterol and animal fat in the diet has also been cited as a factor contributing to the shift from red meats to poultry and fish.

Dairy. The mix of dairy products consumed has changed significantly over the 1970-74 to 1985-86 period (Chart 3). Notably, fluid milk consumption has declined about 17% over the period and a dramatic shift has occurred from whole milk to lowfat milk. Whole milk consumption has declined 42% while lowfat milk has increased 82%. Consumer concerns about cholesterol have been cited as a major factor influencing this shift. Paradoxically, consumers have increased consumption of cheese, which contains about 30% fat compared to 3-4% fat content for whole milk, about 75% over this same period. And, cheese substitutes which contain less fat and cholesterol are often cited as inferior products. Obviously, there is some misinformation in the market place or there are some other important attributes that need to be identified and considered.

In addition to cheese, consumption increases were observed for cream, specialty dairy products, and frozen dairy desserts; up 26%, 41% and 1% respectively.

On balance, dairy consumption increased on a fluid milk equivalent basis due primarily to the dramatic increases in cheese consumption.

Fats and Oils. Per capita consumption of fats and oils increased steadily over the 1970-74 to 1985-86 period from 52 pounds to 64 pounds, an increase of 22 percent. The increase has come almost entirely from shortening, up 5 pounds (32%) and from salad and cooking oils, up 7 pounds (43%). Butter and margarine consumption have changed less than 1 pound each over the same period.

These visible fats, those that are either added directly to foods as spreads or as ingredients such as in bakery products, are contributing an increasing share of total dietary fat. The percentage of dietary fats from visible fats has increased steadily from 43% in 1970-74 to about 47% of total dietary fat in 1985. Invisible sources of fat, those that have naturally occurring fat such as red meats and dairy products, have contributed a declining but still major share of total dietary fat.

Fruits. Per capita consumption of fresh fruits has increased approximately 13 pounds from 76 pounds in 1970-74 to 89 pounds in 1985-86, an increase of 17%. Consumption of noncitrus fresh fruits has been growing while consumption of fresh citrus has declined. Fresh citrus is down 12% over the period while fresh noncitrus is up 34%.

Frozen citrus juice consumption has trended upwards over this period, more than offsetting the decline in fresh citrus (Chart 4). However, frozen citrus has exhibited a cyclical pattern due to adverse weather impacts of freezes on production.

Per capita consumption of noncitrus fruits has trended upwards since 1970 with fresh and frozen fruit consumption increasing while canned fruit consumption has declined.

Socioeconomic and Demographic Variations in Consumption

There have been a large number of studies based on cross sectional household surveys that have identified socioeconomic and demographic factors related to food expenditures, consumption, and nutrition. These studies include Blaylock and Smallwood, Capps, Salathe and Buse, Hassan and Johnson, Raunikar, Purcell, and Huang, Price, and Guseman and Sapp to name a few. The fundamental assumption underlying studies of this type is that individuals belonging to the same demographic, economic, and/or social group are likely to have similar tastes and preferences. In the language of household production, they are likely to have similar household production functions and related environmental factors influencing their behavior. In either case, by including these variables in a statistical demand analysis, it is possible to measure the impact of these variables on consumption behavior.

Tomek (1977), in his review of the literature on food demand, cited income, household composition, and household size as the three most important socioeconomic factors that help explain food consumption variation among households. The studies cited above lend support to his observation. Other factors that have been examined include family lifecycle, education, type of employment, lifestyle, and wage rates and work status of the male and female household heads.

Impact of Household Size and Income on Food. Household size and income dominate all other factors in explaining variation in household food expenditures. Table 3 illustrates these effect using data from the 1985 BLS CCES Diary Survey. The first three columns of data show the relative expenditures per person for total food, food at home, and food away from home, respectively, for households of different sizes and households in different income quintiles. From column 1, we see that a one person household spends 55 percent more per person on total food expenditures than does a 4 person household. It is clear that per person spending drops significantly as household size increases. This is also true of both at-home and away-from-home food spending. The impact of household size is largest on away-from-home food spending.

The last column shows the percent of total food spending spent on food away from home. The percent spent on away-from-home food drops markedly as household size increases. One member households spend about 51% of their total food expenditure on away-from-home food compared with only 23% for households with 6 or more members. This drop is indicative of both an income effect (larger households have lower per person incomes) and a relative price effect due to economies of size in meal preparation. That is, the time and food (less waste) needed to prepare a meal at home increases less than proportionately with household size whereas the cost of meals away from home are likely to increase proportionately with household size. Thus, there is both an income and a relative price effect.

For income quintiles, we find that relative per person spending increases with income group for both at-home and away-from-home food. The effect of income

is largest for away-from-home food. The highest income group spends more than twice as much per person as does the lowest income group, and nearly 70% more than the middle income group. The effect of income away-from-home food spending is clearly shown in the last column of the table denoting the percent of total food expenditure spent on away-from-home food. This increases from 29% for the lowest income group to 42% for the highest income group.

If we were to examine the percent of the at-home food budget spent on various food categories, we would find that higher income households generally spend a larger share of their budget on beef, fish, nonalcoholic beverages and miscellaneous prepared foods and less on processed vegetables, fats and oils, poultry, and eggs. Variation in these budget shares across income groups tend to be small for these broad categories but variations are found to increase as these categories are more finely delineated.

Summary

In summary, the mix of foods we eat has changed significantly over time. And large variations are found in the level of expenditure and source of food (at-home verses away-from-home) across households differing in size and income level. Much of the observed variation can be related back to the basic economic variables of prices and income. By broadening our economic models to include the household production/attribute framework, we can also analyze health information, advertising, convenience, the value of time, and many other factors. Nutrient attributes are clearly found to be important in food purchase decisions but they are also clearly not the only attributes important to consumers.

Three paradoxes related to health concerns and diet persist and deserve further study. One is the steady increase in the consumption of visible fats over time while consumption of invisible fats declines. Another paradox is the marked increase in consumption of some dairy products that are high in fat, such as cream and cheese, while there is a strong shift away from consumption of some lower fat products such as the shift from whole milk to lowfat milk. Finally, we need to identify and learn more about the demand for product attributes that can significantly alter the nutritional content of our diets. For example, take low calorie sweeteners. One might have predicted a decline in consumption of caloric sweeteners with their introduction to the market. Instead, we see consumption of both caloric and noncaloric sweeteners increasing over time. What will be our experience with fat substitutes? Will economist have something to contribute to this issue?

Table 1. The mix of foods we eat is changing.

Item	Per capita consumption				
	Annual average			:Change between	
	1970-74:	1980-84:	1985-86:	'80-84	:'85-86
	-----Pounds-----			--Percent--	
Red meat, poultry, fish, and eggs	261	263	269	1	3
Red meat	161	153	151	-5	-6
Beef	84	77	79	-8	-6
Veal	2	2	2	-20	-7
Pork	62	63	60	1	-3
Lamb	3	2	1	-42	-46
Edible offals	11	9	9	-16	-18
Fish	12	13	15	7	21
Fresh and frozen fish	7	8	9	14	29
Canned and cured	5	5	6	-2	9
Poultry <u>1/</u>	49	64	71	29	44
Chicken	41	53	58	30	44
Turkey	9	11	13	27	48
Eggs	38	34	32	-12	-16
Dairy <u>2/</u>	554	559	593	1	7
Fluid whole milk	205	136	119	-34	-42
Fluid lowfat milk	59	94	108	60	82
Cream	4	4	5	0	26
Cheese	13	20	23	51	76
Frozen desserts	28	27	28	-5	1
Specialty products	3	5	7	86	141
Fats and oils <u>3/</u>	52	58	64	11	22
Butter	5	5	5	-8	-5
Margarine	11	11	11	-1	1
Shortening	17	19	23	11	32
Salad and cooking oils	17	22	24	29	43
Fresh fruits	76	86	89		
Citrus	27	26	24	-6	-12
Noncitrus	49	60	65	23	34
Fresh vegetables	65	74	79	14	21

--Continued

Table 1. The mix of foods we eat is changing--Continued.

Item	Per capita consumption				
	:Change between				
	Annual average : 1970-74 and				
	1970-74:	1980-84:	1985-86:	'80-84 :	'85-86
	-----Pounds-----			--Percent--	
Potatoes <u>4/</u>	76	72	78	-6	2
Fresh	54	45	48	-16	-11
Processed	22	26	30	21	36
Wheat flour	111	117	126	5	14
Rice	7	10	10	42	46
Pasta	9	10	14	21	60
Sugars and sweeteners	129	136	146	5	8
Caloric sweeteners	124	125	130	1	5
Refined sugar	101	75	62	-25	-39
Corn sweeteners	22	49	67	121	204
Noncaloric sweeteners	5	11	18	100	239

Source: Food Consumption, Prices, and Expenditures, 1987, ERS, USDA in progress and National Food Review, April-June 1988.

Note: Totals may not add due to rounding or conversion to standardized unit. Percentages calculated from unrounded numbers.

1/ Includes ducks and geese. 2/ Milk equivalent fat solids basis. 3/ Product weight excludes cottage cheese. 4/ Includes edible tallow and other edible fats and oils.

Table 2. Changes in per capita consumption and prices for beef, pork, poultry, and fish: selected years, 1970-87.

Item	Consumption				Prices			
	Initial:	Change from			Relative change from			
	level :	previous period :			previous period ^{1/}			
	'70-74	'75-79	'80-84	'85-87	'70-74	'75-79	'80-84	'85-87
	-----pounds-----				-----percent-----			
Meat, Poultry, Fish	209.2	4	5	8	-	-5	-4	-3
Beef and veal	85.9	5	-12	-0	-	-11	1	-11
Pork	62.1	-6	7	-3	-	1	-16	0
Poultry	49.1	5	10	10	-	-13	-13	1
Fish	12.1	1	0	2	-	13	4	10

^{1/} Relative change in CPI for selected items adjusted for year-to-year changes in CPI for all food-at-home items.

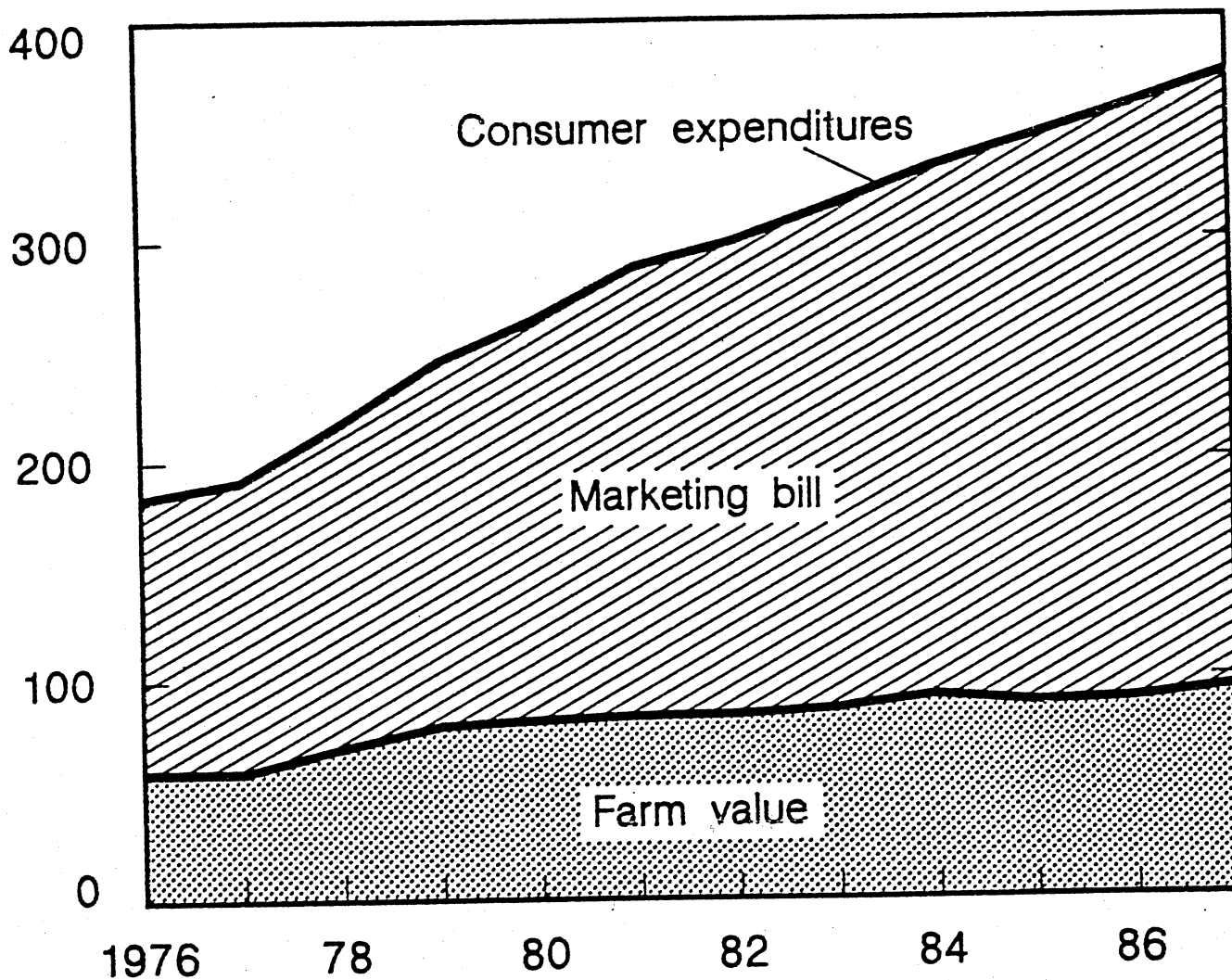
Table 3. Household Size and Income Impact Food Expenditures.

Category	Relative per person spending			Proportion spent away from home
	Total food	At-home	Away-from-home	
	percent			
Household Size (members)				
1	155	114	238	51
2	141	132	160	37
3	111	107	119	35
4	100	100	100	33
5	88	91	82	31
6 or more	73	84	51	23
Income Quintile				
Lowest	82	89	70	29
Second	87	93	77	30
Middle	100	100	100	34
Fourth	111	105	123	38
Highest	137	122	167	42

Source: 1985 BLS CCES Diary Survey.

Marketing Bill, Farm Value, and Consumer Expenditures for Farm Foods

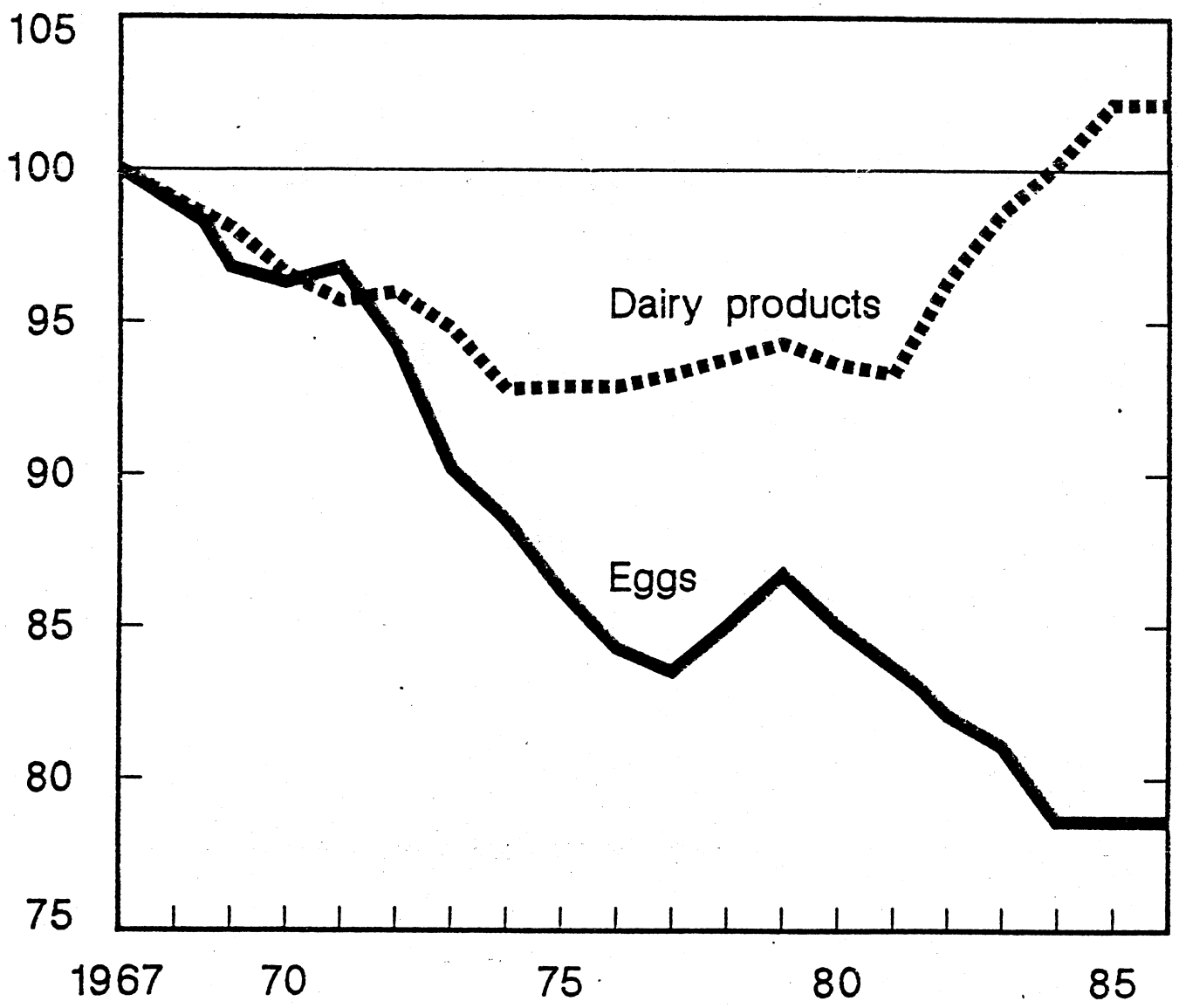
\$ billion



1987 preliminary. Data for domestically produced farm foods purchased by civilian consumers for consumption both at home and away from home.

Per Capita Consumption of Eggs and Dairy Products

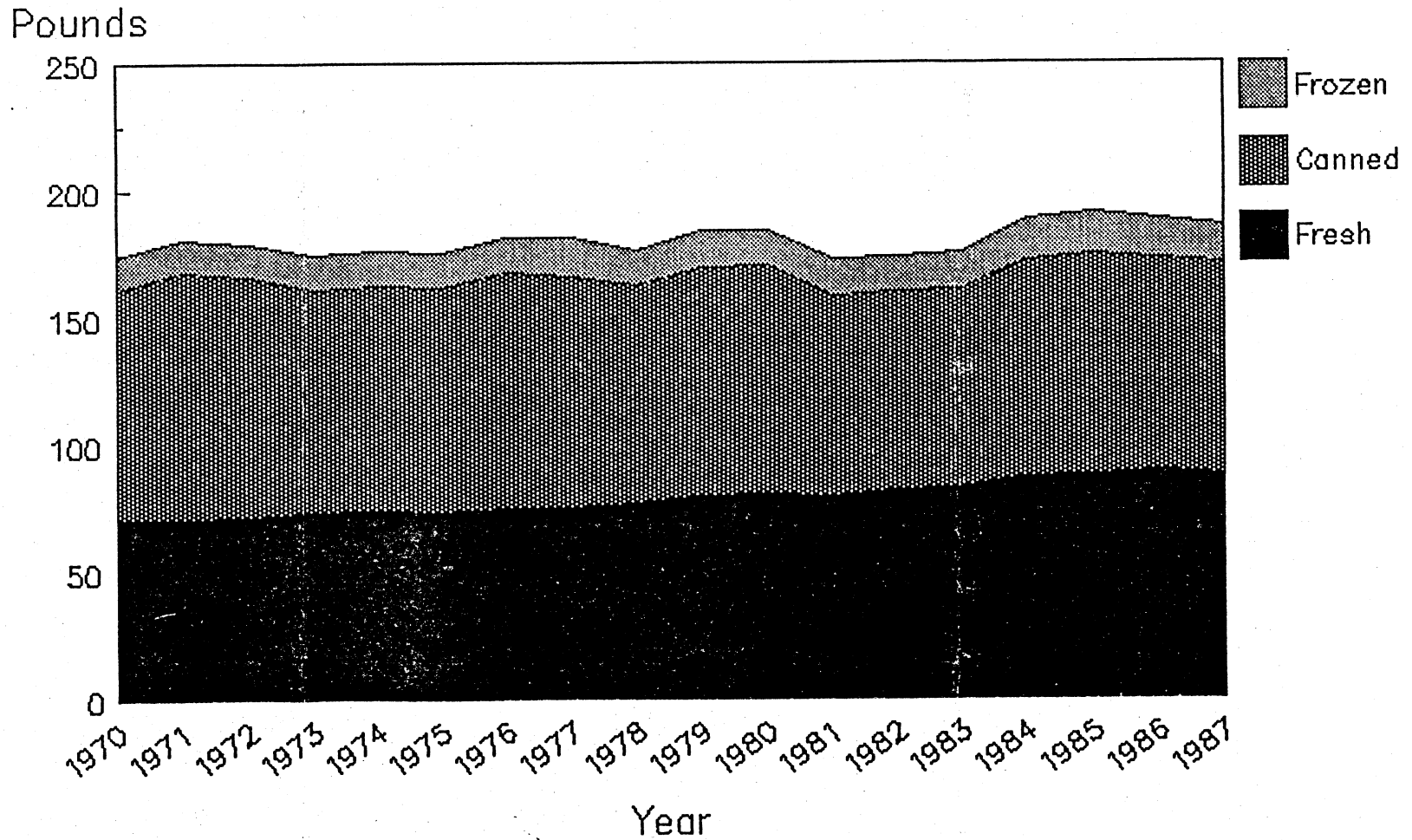
% of 1967



Per-Capita Utilization of Vegetables

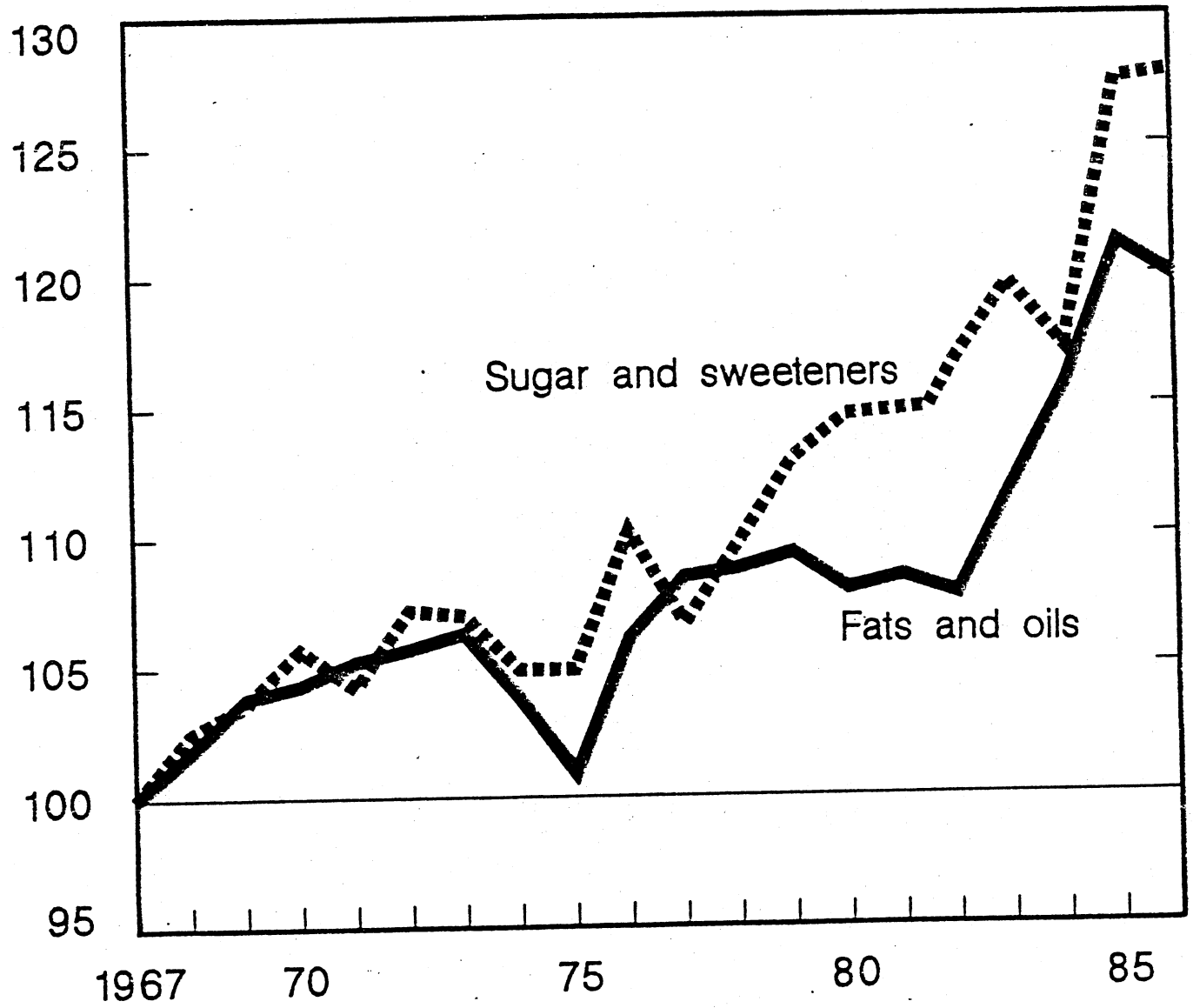
Fresh, Canned, and Frozen

1970-87



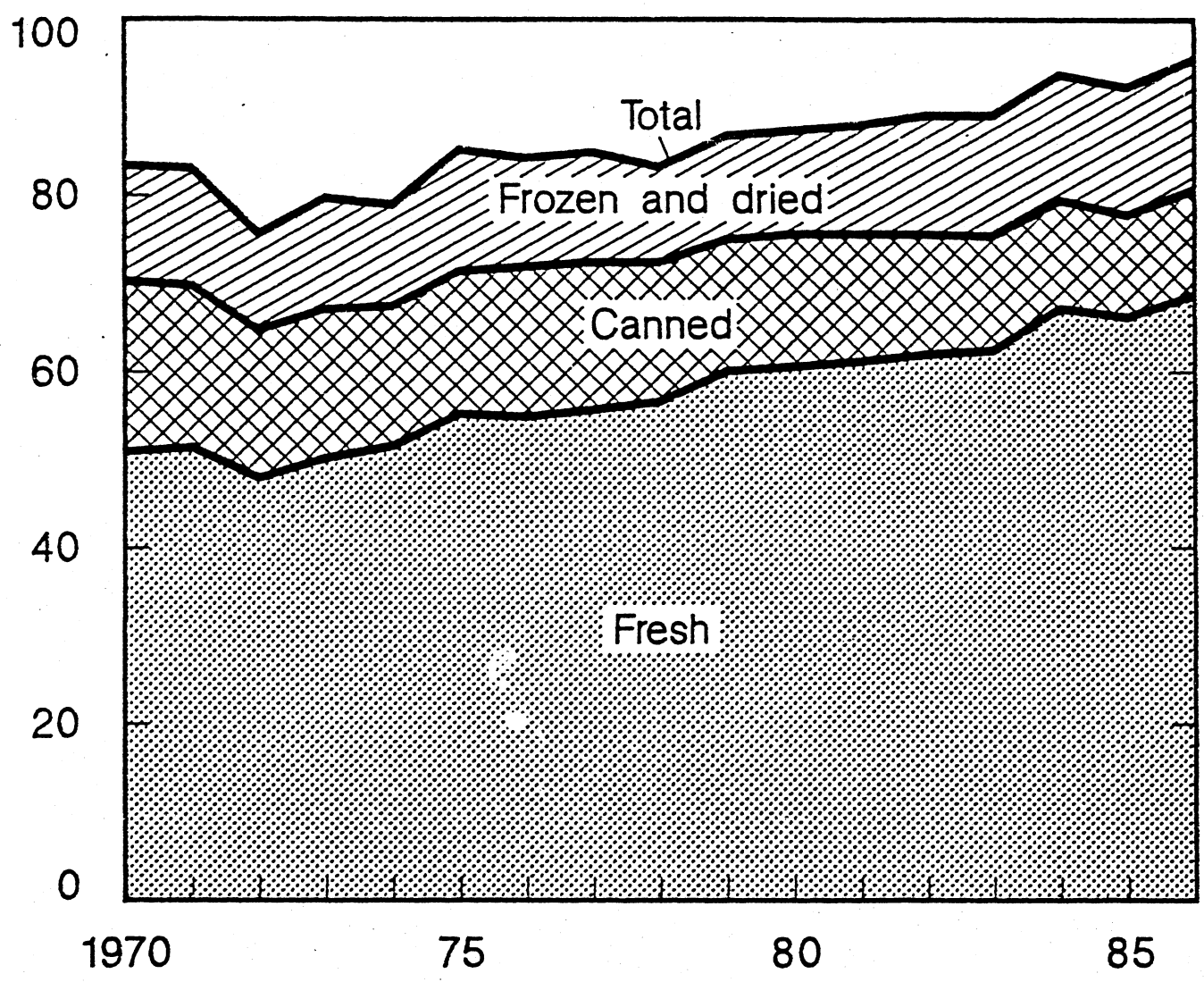
Per Capita Consumption of Selected Processed Products

% of 1967



Per Capita Consumption of Noncitrus Fruit

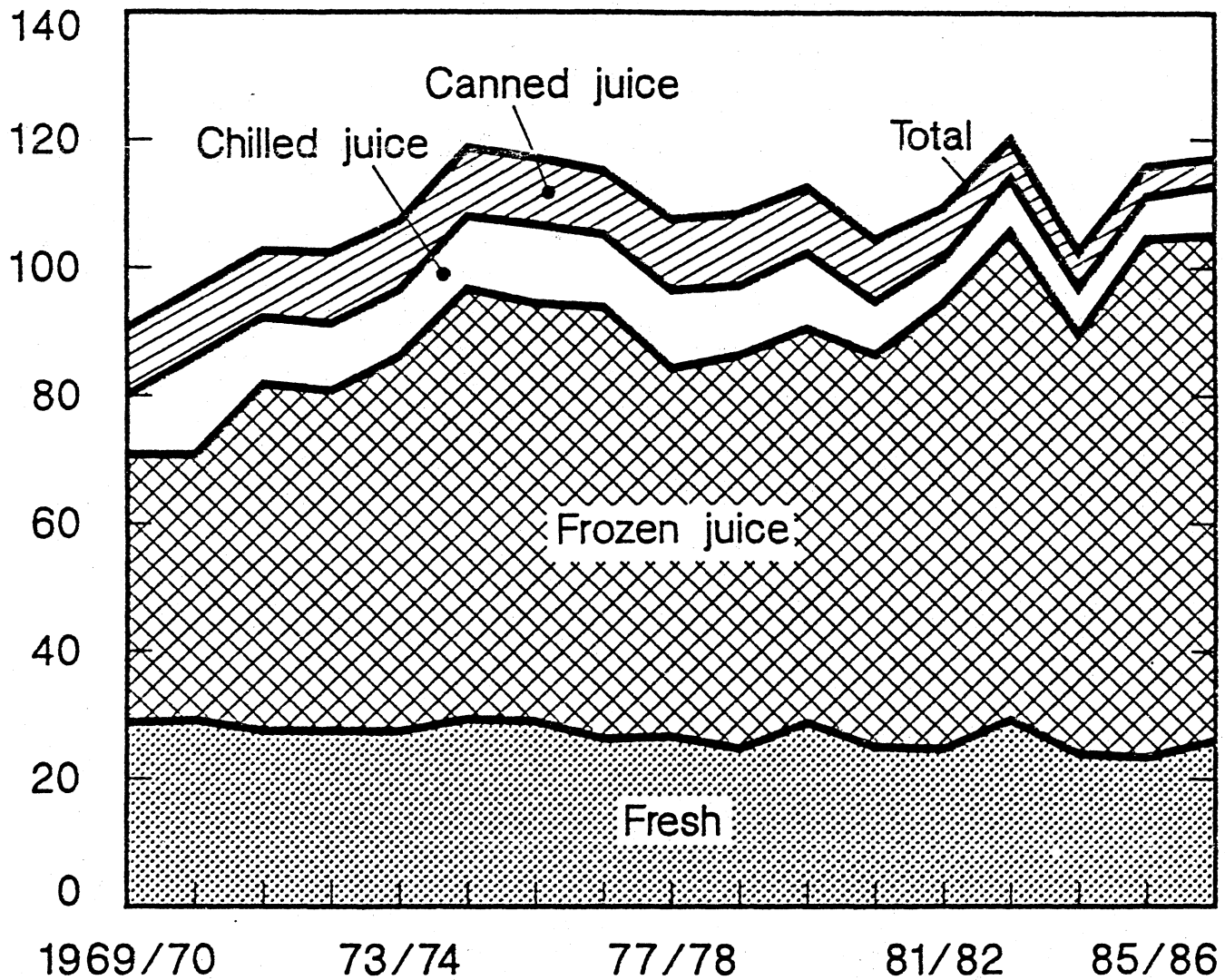
Pounds



1986 preliminary. Fresh-equivalent basis. Canned includes fruit and juice.

Per Capita Consumption of Citrus Fruit

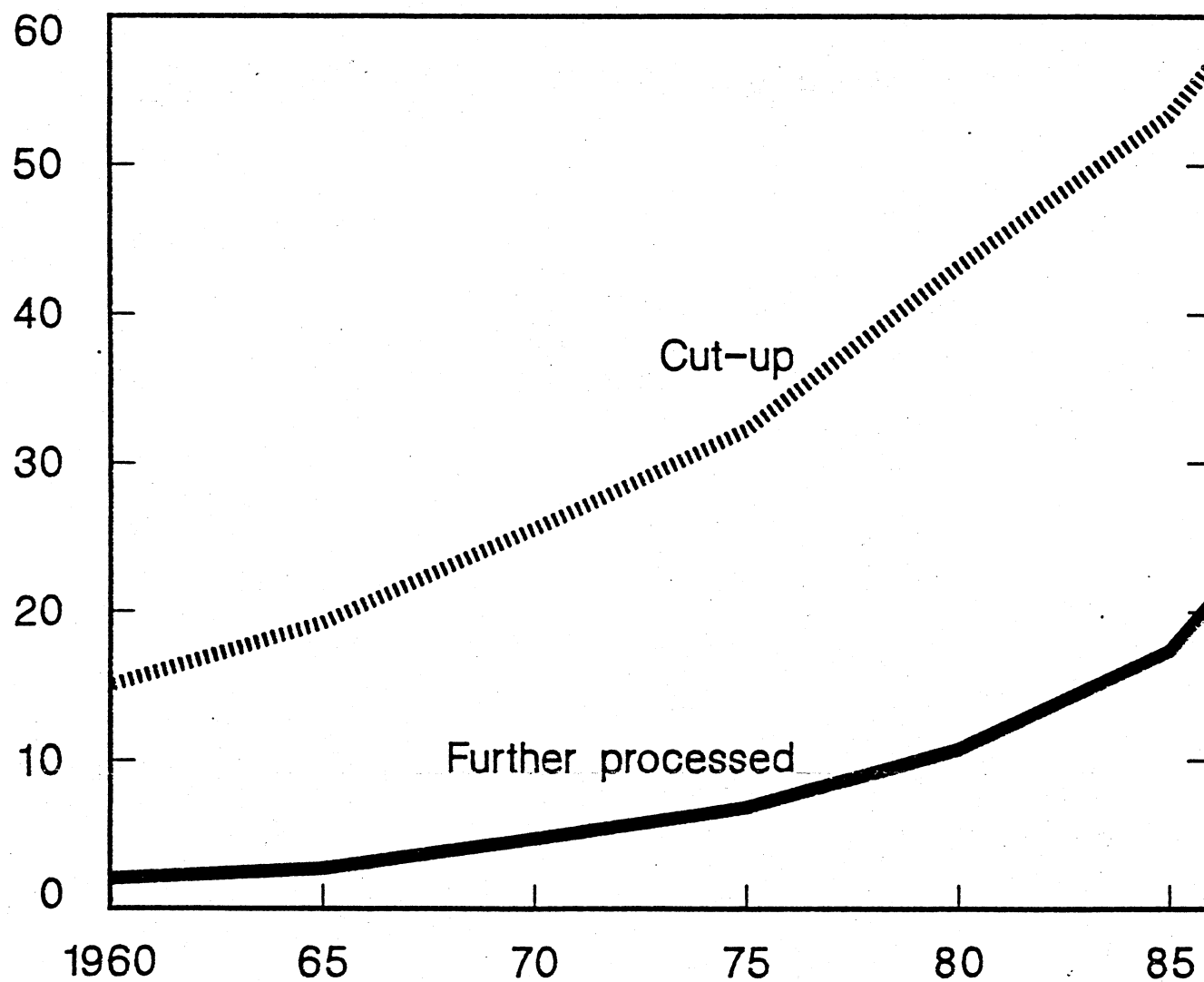
Pounds



1985/86 preliminary. Fresh-equivalent basis.

Young Chickens: Percentage Cut-Up and Used in Further Processing

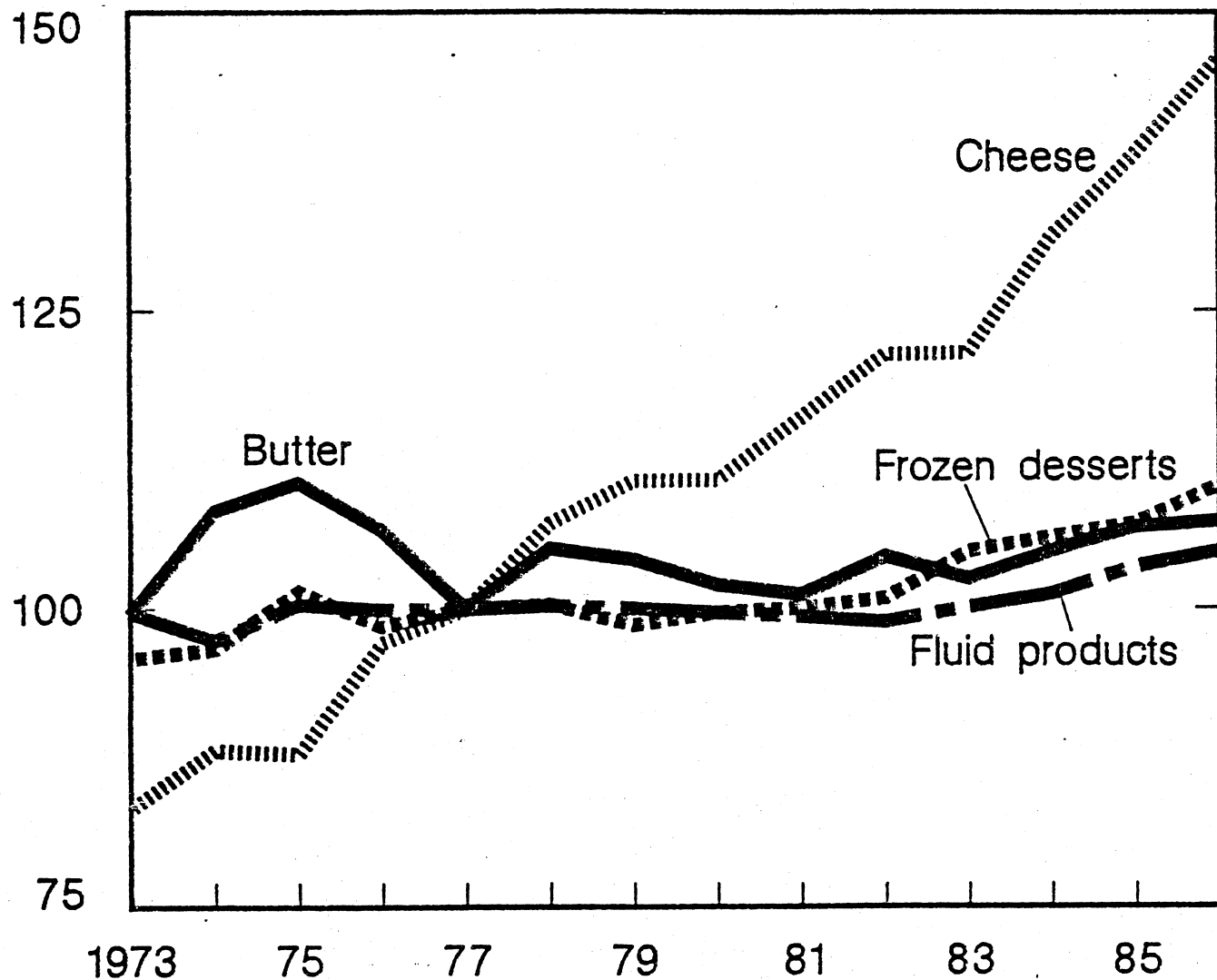
% of certified RTC



Pounds of certified ready-to-cook (RTC).

Dairy Product Sales

% of 1977



Fluid products include cream and specialty items. Cheese excludes cottage cheese.