

AN ANALYSIS OF SELECTED POTATO CONSUMER
CHARACTERISTICS AND TRENDS OVER
TIME-IMPLICATIONS FOR THE INDUSTRY

by
Vicki A. McCracken
Agricultural Economist
Washington State University

Introduction

The U.S. diet has changed considerably in recent years. Americans are consuming more food as a result of higher consumption of crop products. Numerous factors are responsible for these changing consumption patterns, including demographic and lifestyle changes, limited time for food preparation, increases in real disposable income, and diet, health, and food safety concerns. New product developments, new varieties or altered versions of existing products, and advertising campaigns have also contributed to shifts in consumption.

The purpose of this presentation is two-fold: first, to provide a broad overview of consumption changes in recent years; and second, to focus specifically on factors impacting the consumption of potatoes and products perceived to be substitutes for potatoes. Knowledge of major consumer trends and an understanding of their marketing implications is critical for the potato industry.

The presentation is organized as follows. Consumption changes over recent years are first discussed and reasons for these changes are briefly summarized. Second, the results of a study identifying how select demographic and economic variables affect potato and potato substitute consumption behavior are discussed. The presentation will conclude by identifying some implications for the potato industry.

General Expenditure and Consumption Information

In 1990, food and beverage (excluding alcohol) expenditures in the United States totaled \$546 billion, up 6 percent from the \$515 billion total in 1989, and up over five-fold from the \$86.7 billion total in 1965. These numbers, however, do not account for the general inflation that has occurred over the last several decades. In real terms (adjusted for inflation), overall food sales increased by 0.3 percent between 1989 and 1990.

Over the last several decades, the food spending increases have not matched the gains in disposable income (income after taxes). Food spending's share of disposable income was 15.3 percent in 1965 and 11.7 percent in 1989.

This Presentation is part of the Proceedings of the 1992 Washington State Potato Conference & Trade Fair.

In 1990 food expenditures rose more than disposable income, however, with food accounting for 11.8 percent of disposable income. The share of the U.S. food dollar going to purchase meals and snacks away from home was 45 percent in 1990, up considerably from 34 percent in 1969 and 24 percent in 1949. Compared to 1989, away-from-home food spending increased 7.2 percent in 1990.

Per capita consumption of all foods rose 8 percent since 1970, as measured by USDA's price-weighted food consumption index. The greatest increases occurred in the most recent years, with the increases driven by higher consumption of crop-derived foods as compared to foods from animals. Consumption of crop-derived foods jumped 16 percent while consumption of animal products increased only 1 percent since 1970.

Food Consumption Changes

The increase in crop foods was due to increased consumption of a number of products including vegetable fats and oils, flour and cereal products, fruits, fresh and frozen vegetables, frozen potatoes, peanuts, and tree nuts. Consumption decreases were recorded, however, for canned vegetables, dry beans and peas, and coffee. Total per capita consumption of animal products has been fairly stable in the last several years, but the mix of products consumed has changed. Red meat, eggs, whole milk, butter, and lard were losers in 1989, while poultry, fish and shellfish, lowfat milk products, cream products, and cheese were winners.

Total per capita consumption of vegetables (excluding potatoes) was down slightly in 1990, but is almost a 15 percent increase (on a farm-weight basis) from the early 1970's (Figure 1). Differentiating by product form in which these products were consumed, per capita consumption of fresh vegetables increased markedly, up from about 110 pounds per person in the early 1970's to over 135 pounds by the late 1980's. Canned vegetable consumption declined fairly steadily in the 1970's through mid-1980's but has rebounded somewhat in the last several years (decreasing from 98.0 pounds per person in 1971 to 83.7 pounds in 1988, then increasing to 92.9 pounds in 1990), and consumption of vegetables used for freezing has gradually increased since the 1970's.

Potato consumption deviates somewhat from the general shift towards fresh vegetable consumption (Figure 2). While total potato consumption trended upward slowly during the 1970's and 1980's (from 117.8 to 129.3 pounds per person on a farm-weight basis between 1971 and 1990), there has been significant changes in the composition of potato consumption. In 1971, almost half of all potatoes were consumed in the fresh product form, but in 1990 fresh potatoes accounted for only about one-third of all potatoes. The growth in the potato industry has come from large increases in frozen potato consumption (from about 30 to 50 pounds per person per year), which has been due mainly to the increased popularity of french fries in the fast-food market. Rice and pasta are often considered as substitutes for potatoes. Consumption of both of these products has more than doubled since the late 1960's.

The immense food industry has increasingly been driven by consumers rather than by producers, and hence the basis of successful marketing is understanding the ultimate consumer. The following section outlines some of the major consumer trends that have impacted food consumption trends.

Overview of Reasons for Changing Food Consumption Patterns

The demographic structure of the U.S. population has undergone major changes in recent years, and these changes have implications for the food industry. A basic demographic change is the declining rate of population growth, and the Census Bureau projects that within the next 50 years the population will actually decline. This population growth decline has obvious implications for total food demand. The population is also growing older and living longer, residing in smaller households, and moving South and West. The number of people 65 years of age and older is expected to double during the next half-century. This population segment typically has greater health problems and requires products (such as low-sodium or low-fat) that meet their special needs. Household size has decreased from 3.14 people in 1970 to 2.63 people in 1990, the traditional family household of mother-father-kids is no longer the norm. Single person households, which include both the young and the old, currently account for about one-quarter of all U.S. households. Households with two or more members account for over half of U.S. households. Nontraditional households may be more likely to eat away-from-home, demand greater convenience in the foods they purchase, or buy smaller packaging units. It is projected that 6 out of 10 Americans will live in the sunbelt by the year 2000, with greatest population growth in California, Texas, and Florida. The racial and ethnic mix of the population is also changing, with the greatest increases in the Hispanic and Asian groups. Regional migration and changing racial and ethnic composition of the population influence U.S. food use patterns.

Increased participation of women in the paid labor force is typically identified as one of the major social and economic trends over the last quarter century, and one that has had major impacts on the food industry. The labor force participation rate increased for all women from 35 percent in 1960 to 57 percent in 1988; for married women 35-44 the rate increased from 36 percent to 73 percent; and for married women with a child or children less than 6 years old the rate reached 57 percent. Despite their labor force commitments, women still do almost all of the cooking in U.S. households. It is not surprising that convenience has become one of the more important attributes of food products. Over three-fourths of all U.S. households have a microwave oven in their home, and the number of items in the supermarket designed for the microwave has dramatically increased.

Some of the significant trends in food consumption have stemmed from improved information about the link between diet and health. The shift from a concern about preventing diseases associated with nutritional deficiencies to an emphasis on the contribution of nutrition to good health and decreasing risks of chronic diseases is reflected in current dietary recommendations.

The new U.S. Dietary Guidelines issued by the Departments of Health and Human Services and Agriculture in late 1990 indicate specific limits on the amount of fat that Americans should eat (30 percent or less of total calories from fat, with less than 10 percent from saturated fat high in cholesterol) and the amount of alcohol that might be consumed. Recommendations on the number of servings that should be eaten daily from major food groups were changed to encourage greater consumption of fruits, vegetables, and grain products.

An issue of increasing popularity to the media and of increasing importance to consumers is that of food safety. The Food Marketing Institute in its 1990 Trends: Consumer Attitudes and the Supermarket survey found that 80 percent of the responding consumers were concerned about pesticide residues. Most consumers, however, believed that food in their supermarkets was safe and had not altered their food purchasing behavior.

Analysis of Consumption Potatoes and Potato Substitutes

The previous discussion emphasized changes in food consumption behavior, including potatoes, over time and has identified some major factors responsible for these changes. The focus now will be on identifying how select demographic and economic variables affect household potato (fresh and processed) and potato substitute consumption behavior. The analysis uses data from the recently released USDA Nationwide Food Consumption Survey (USDA NFCS 87/88).

The NFCS provides detailed information on household food consumption and socioeconomic and demographic information about the household. The food consumption component of the survey measured the "disappearance" of foods--that is, the amount of food consumed or disposed of--from home food supplies over a 7-day period. The household's main meal preparer was asked to provide information on 21 food groups (each comprising more detailed categories) used by the household and the cost of that food. Other questions concerned the household's composition, income, and other socioeconomic characteristics, and food expenditures and buying practices. The data was collected over all seasons of the year. In this survey, spring season includes April, May, and June; summer season includes July, August, and September; fall season includes October, November, and December; and winter season includes January, February and March. After eliminating incomplete survey questionnaires and nonhousekeeping households the data set used in the analysis included 4273 households.

A number of socioeconomic and demographic variables were considered in this preliminary, descriptive analysis. They include season, household size, household type, household income, location of residence of household--division of country and urbanity, status of household head, race of respondent, education level of food preparer, preferred source of nutrition information, and ownership of microwave oven. These variables were cross-tabulated against average weekly per person consumption, average weekly household consumption, and average price (unit-value) paid by household.

These averages were calculated across households actually consuming the product under consideration. The variables were also cross-tabulated against a market penetration or percent consumption variable. This variable was calculated as the ratio of the number of households actually consuming the product divided by the number of sample households for a particular category of a variable. For example, using the single female aged 19-64 years household type, market penetration or percent consumption is the number of these single female households that consumed potatoes divided by the total number of these single female households.

The potato products analyzed include all potatoes, fresh potatoes, potato chips, and french fried potatoes. The potato substitutes analyzed include rice and pasta. Only selected results are presented here. In 1984, Schotzko conducted a similar (but not identical) analysis with select socioeconomic variables for fresh potatoes only, using an earlier version of the NFCS data (the 1977/78 NFCS). Comparisons of the 1977/78 and 1987/88 NFCS results will be made in the following discussion, where possible. Market penetration or the percent of the sample households consuming a product varied considerably across the products considered (Figure 3). Almost eighty percent of the households consumed some type of potato product at home during the survey week, with 67 percent having consumed fresh potatoes, 32 percent having consumed potato chips, and only 6 percent having consumed french fries at home. About one-third of the sample had consumed rice or pasta during the survey week.

Results - Fresh Potatoes

Fresh potatoes were consumed by two-thirds of the sample households. There was considerable variation in market penetration across households of different compositions (Figure 4). Only 42 percent of households consisting of single males aged 19-64 consumed fresh potatoes, while 80 percent of households consisting of a male and female with one or both over 64 years of age consumed fresh potatoes. Households with more than two adults also had a high probability of consuming fresh potatoes (75 percent). The quantity consumed of fresh potatoes also varied across household type. Figure 5 presents quantity consumed both on a per person basis (referred to as Quantity in the graphs) and on a household basis (referred to as Household Quantity). On a household basis, fresh consumption was highest (5.20 pounds per week) in households with both a male and female head and more than one child (18 years or younger). Households with more than two adults were also big consumers of fresh potatoes (4.91 pounds per week). Note that both of these households by definition contain more members than the typical sample household. These findings are consistent with Schotzko's analysis based on the 1977/78 NFCS data.

Fresh potato consumption on a per person basis was highest in the single person households, with either a single adult male or single adult female. For example, single males 19-64 years of age consumed 2.27 pounds of fresh potatoes per week. In contrast, households with children were low consumers of fresh potatoes, on a per person basis.

For the most part, the emphasis in the following discussion will be on the per person consumption measure as it partially controls for the effect of household consumption, making it easier to analyze the impact of either factor.

Another interesting result was the differences in price paid for fresh potatoes by households of differing composition (Figure 4). Single males 19-64 years of age paid \$.36 per pound on average for their fresh potato purchases, while two-adult households with more than one child on average paid only \$.23 per pound. These price differences reflect both economies that larger households can realize by purchasing larger quantities of potatoes as well as differences in the products actually purchased.

In the 1977/78 NFCS data, Schotzko found important differences in fresh potato consumption across the seasons of the year. While there were some differences in market penetration and per person consumption across seasons, seasonality was not a major factor in fresh consumption in 1987/88.

Fresh potato consumption was also tabulated against the before-tax income level of the household (Figure 6). There was no significant difference in market penetration by income level. This is in contrast to Schotzko's finding of increases in market penetration up to about \$50,000 and then decreases thereafter. In the 1987/88 data, there was a steady decrease in per capita consumption as income level increased. Per person consumption for households with annual income less than \$10,000 was about 1.70 pounds per week, and with annual incomes greater than \$40,000 was 1.06 pounds. Price per pound paid for fresh potatoes was higher for the lower and upper income classes and lower for the middle income classes (Figure 6).

Market penetration increased as household size increased, as expected, with penetration of only 50 percent for one person households and over 75 percent for households with more than 5 members (Figure 7). Measuring consumption on a per person basis and then grouping by household size allows one to isolate the household effect. As shown in Figure 7, consumption declined fairly steadily as household size increased. These results are in contrast of those of Schotzko, who found a sharp peak in consumption for 3-person households and not much difference for other sized households.

Households residing in different parts of the country frequently exhibit different food consumption patterns. Fresh potato market penetration ranged from a low of 59 percent in the Pacific states to a high of 70 percent in the East South Central states (Figure 8). The pattern for per capita consumption was similar, with lowest consumption in the Pacific states (1.15 pounds) and the highest consumption in the East South Central states (1.63 pounds).

Single parent households have increased in number in recent years. The consumption patterns for these households are frequently different from those of traditional two-parent households. As shown in Figure 9, market penetration for fresh potatoes differed dramatically for households with both male and female heads present (71 percent), with a female head only (60 percent), and with a male head only (45 percent).

Per person consumption was the highest in the single male head households (1.90 pounds) (Figure 10) and these households paid the highest price for fresh potatoes (\$.33 per pound) (Figure 9).

Race of the individual in the household responding to the survey did not appear to have a major impact on fresh potato consumption. Education level of the individual in the household responsible for food preparation impacted both market penetration and quantity consumed for fresh potatoes (Figure 11). Market penetration averaged 69 percent for households with a high school degree or lower and 55 percent for households with more than a college degree. Per capita consumption was at a high for households with a grade school degree or lower (1.65 pounds per week) and at a low for those with more than a college degree (.99 pounds per week). These results of lower market penetration and consumption at higher education levels were also reported by Schotzko for the 1977/78 NFCS data.

Potato Chips

Slightly under one-third of all households in the sample consumed potato chips from home food supplies during the seven-day survey period. Market penetration varied significantly across household types (Figure 12). Only 5 percent of households consisting of a single male over 64 years of age consumed potato chips, while almost 50 percent of households with both male and female adults and more than one child consumed potato chips. Market penetration was relatively high in any household type that contained children and low in households with older adults. In contrast, per person consumption was lowest in households with two adults and more than two children (.22 pounds) and highest in single person households (e.g., .46 pounds for single male, 19-64).

Unlike fresh potatoes, market penetration for potato chips differed across income levels (Figure 13). Market penetration was only about 20 percent for households with annual income less than \$10,000 and was about 34 percent for the above \$40,000 households. Per person chip consumption tended to decline as income increased, but consumption differences were small except for the lowest and highest income categories. As expected, potato chip market penetration increased as household size increased until a size of 4 members, then leveled off (Figure 14). Per person chip consumption fell fairly quickly as a household size increased (from .44 pounds for a single person household to .20 pounds for a household with 6 or more members).

Potato chip market penetration and consumption differed across location of residence of the sample households (Figure 15). Only 18 percent of the Pacific states' households consumed potato chips while 40 percent of the households in East North Central states consumed potato chips. Per person consumption was lowest in the New England states (.22 pounds) and highest in the South Atlantic (.33 pounds) and West South Central states (.34 pounds).

Potato chip market penetration was twice as high for two-parent households as for male headed households (35 and 17 percent, respectively) (Figure 16). On a per person basis, however, the male headed households consumed more than the two-parent households (.45 and .26 pounds, respectively). As expected, the highest educated households were less likely than intermediate educated households to consume potato chips (24 percent and 32 percent, respectively), but the higher educated households consumed the largest quantity of chips (2.05 pounds) (Figure 17).

French Fries

The NFCS data used in the analysis only includes information on foods consumed from household food supplies. Only 6 percent of the sampled households consumed french fries at home during the 7-day survey period. Because of this low market penetration, the analysis for french fries focused only on market penetration by select household variables, and is summarized in the following paragraph.

Market penetration differed across household types, and was highest in households with children (13 percent). Unlike fresh potatoes, there was some seasonality in french fry market penetration. Penetration peaked in the winter at 8 percent and was at a low in the summer at 4 percent. The percent of the households consuming fries was higher at the upper income levels in the larger sized households. Consistent with other potato product forms, households in the Pacific states were least likely to consume french fries (2 percent market penetration). Households with two parents were twice as likely to consume fries than male-headed households (7 and 3.5 percent, respectively). And finally, market penetration was highest for households whose meal planner was a high school graduate (7 percent) and lowest for those with a grade school or less education (3 percent).

Rice and Pasta

Many households consider rice and pasta as substitutes for potatoes in a meal. Thirty-three percent and 36 percent of the sample consumed rice and pasta, respectively. These percentages differed considerably across the sample for a number of household variables.

Market penetration for rice (Figure 18) was lowest in households with a single male over 64 years of age (9 percent) and highest in traditional-type households with two adults and more than one child (40 percent) and nontraditional households with 3 or more adults (40 percent). The average price paid for rice ranged from \$.87 per pound by single-parent households to \$1.32 per pound by two-person households with a male and female, both 19-64 years of age.

Households in the Pacific states, while not major consumers of potato products, had a high probability of consuming rice (41 percent) and consumed a substantial amount of rice (.47 pounds per person) (Figure 19).

Market penetration in the East South Central states was low (24 percent), and these households consumed relatively little rice (.29 pounds per person). With respect to the degree of urbanization of location of residence, households in central city areas were more likely than households in suburban and nonmetropolitan areas to consume rice (41, 31, and 29 percent, respectively) and consumed large quantities of rice (.53, .36, and .38 pounds per person, respectively).

Race/ethnic origin of the respondent was a major factor in rice consumption (Figure 20). White households were less likely to consume rice than households that were not white/not black (30 and 71 percent, respectively). In addition, these other race households were big consumers of rice (.96 pounds), consuming twice as much as blacks (.53 pounds) and almost three times as much as whites (.35 pounds). Market penetration for rice did not vary by education level of the food prepared, but the lowest and highest educated food preparers consumed the greatest amount of rice (.61 and .51 pounds per person, respectively).

Access to a microwave oven did not affect market penetration for rice, but was associated with differences in consumption levels and price. Households having access to a microwave oven consumed smaller amounts of rice and paid a higher price for the rice that they purchased relative to households not having access to a microwave oven (.36 versus .56 pounds per person, and \$1.15 versus \$.87, respectively).

The pattern in which pasta consumption varied across household types was similar to the other products considered (Figure 21). Market penetration was highest for the larger sized households (particularly those containing children), while per person consumption was highest for the single person households. Market penetration ranged from 14 percent (single male over 64 years of age) to 50 percent (two adults and more than one child). Per person pasta consumption ranged from .25 pounds (two adults and more than one child) to .64 (single male, 19-64 years of age).

Figure 22 illustrates the tendency for pasta market penetration to increase as income level increased (27 percent for the \$5,000 - \$10,000 income group and 48 percent for the over \$60,000 income group), but for per person consumption to decline as income level increased (.44 pounds for the \$5,000 - \$10,000 income group and .30 pounds for the over \$60,000 income group). There was a large variation in pasta consumption across geographic regions of the United States (Figure 23). Market penetration was low for pasta in the East South Central states (25 percent), the area of the country in which fresh potato market penetration was the highest (70 percent). Per person pasta consumption was also lowest in the East South Central states (.28 pounds). The area with the highest penetration and per person pasta consumption was the New England states (51 percent and .44 pounds, respectively), an area where fresh potato consumption was relatively low.

In contrast to the results for potatoes, there was not much variation in pasta market penetration across education level of the food preparer except at the lowest education level (about 37 percent for education levels greater than grade school graduate, and 27 percent for grade school graduate or less). There was no variation in per person pasta consumption across education levels (all were about .34 pounds).

Conclusions and Implications

The U.S. diet has changed considerably in recent years. Consumption of crop-derived products, including vegetables and potatoes, has increased over this time period. There has been a general tendency to consume more fresh and frozen vegetables and less canned vegetables. For potatoes in particular, over the last two decades consumption of the frozen product surged while consumption of the fresh product declined (but has stabilized in recent years). Consumption of rice and pasta, common substitutes for potatoes, has also been increasing.

These consumption changes are partially associated with changes that have occurred in the demographic structure of the U.S. population. The presence of more women in the paid labor force has increased the importance of convenience in foods. Some of the trends in food consumption are also related to the improved information about the link between diet and health, and the increased concern about food safety. Past research has indicated that rising per capita income, declining household size and changing composition, increasing concentration of racial and ethnic minorities and the growing number of female wage earners and dual-earner households have had a depressing effect on fresh potato consumption at home, but have stimulated consumption of processed products away from home.

On the basis of the analysis of the USDA Nationwide Food Consumption Survey, a number of factors were identified that define market segments with differences in market penetration and consumption, as well as prices paid, for potatoes (fresh, chips, and fried) and potato substitutes (rice and pasta). For example, market penetration for fresh potatoes was low in households consisting of single males aged 19-64 while this group of men were big consumers of fresh potatoes (when they consumed them). As there is a growing number of this type of household, the potato industry might consider focusing marketing efforts on this population segment. Similarly, both fresh potato market penetration and consumption was low for households residing in the Pacific states. Market penetration was also low for potato chips and french fries in the Pacific states, but households in these states were major consumers of rice. The potato industry might consider focusing on this geographic area in their efforts to increase potato consumption. And as a final example, households that were not white/not black constitute the major portion of the rice market, an important substitute for potatoes. The potato industry might benefit by developing products or recipes acceptable to this group, and appropriately target marketing them.

Lastly, consumer food purchase decisions are the end results of a complicated set of economic, sociological, psychological, anthropological, and physiological factors. These factors have an interactive impact on consumers' decisions, and hence should be considered simultaneously in the development of production and marketing plans. Work in progress by this researcher accounts for the simultaneous impact of some of these factors on consumer potato demand.

Figure 1. Per Capita Vegetable and Melon Consumption

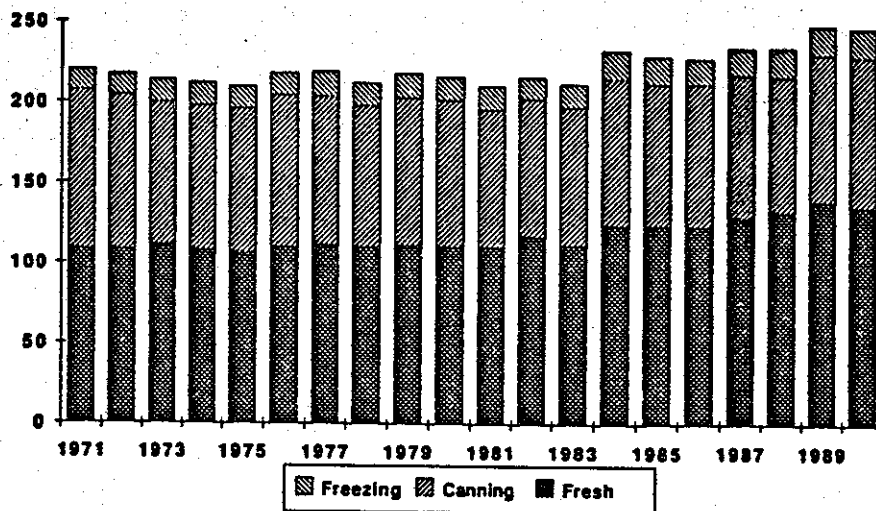


Figure 2. Per Capita Potato Consumption

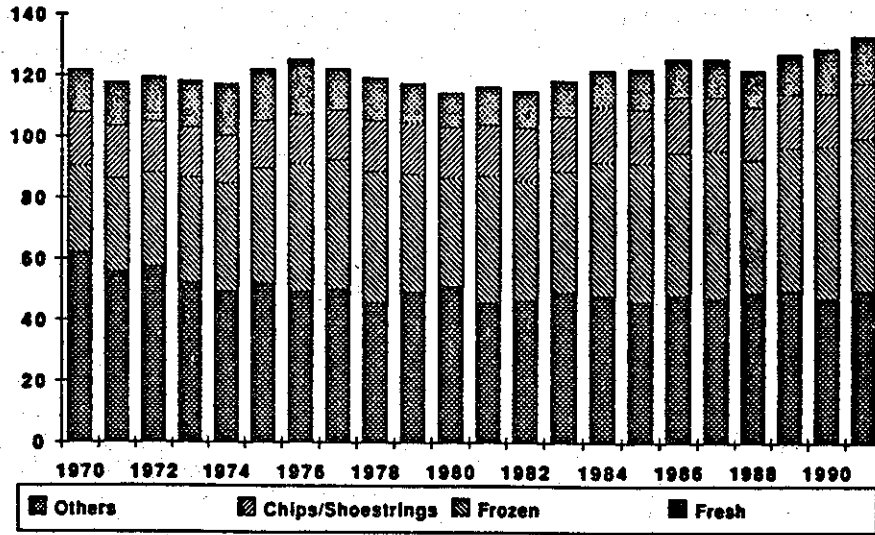


Figure 3. Percent Consumption - All Households

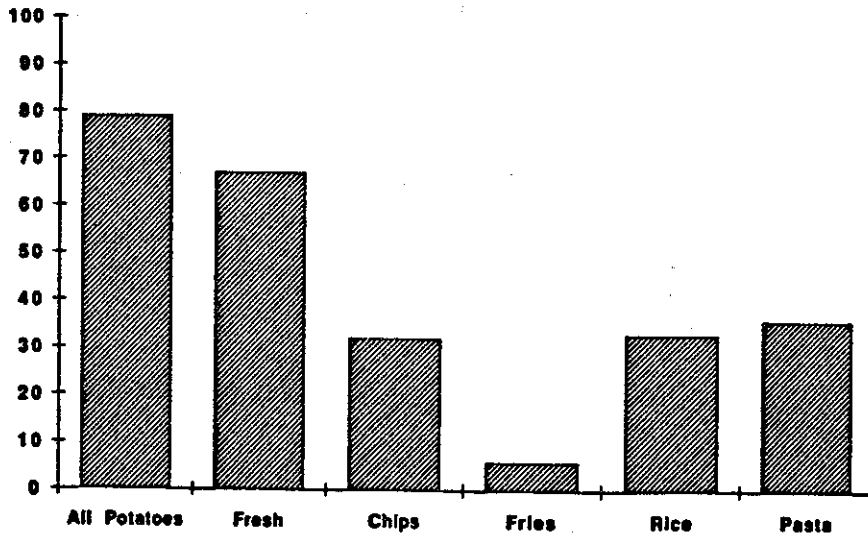


Figure 4. Fresh Potatoes by Household Type

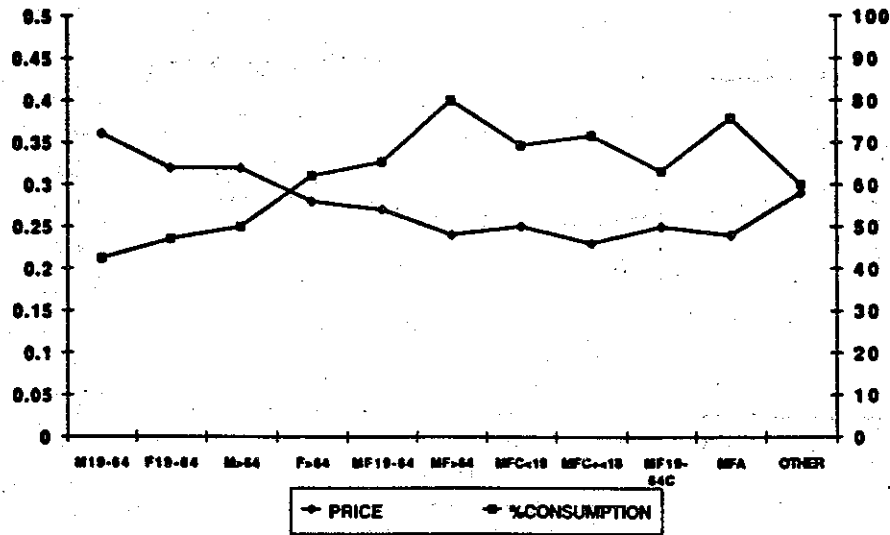


Figure 5. Fresh Potatoes by Household Type

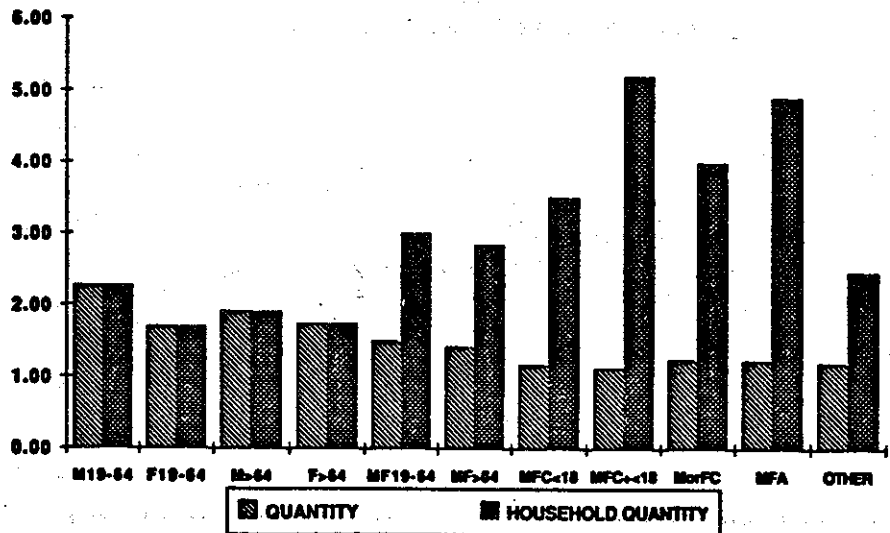


Figure 6. Fresh Potatoes by Income Level

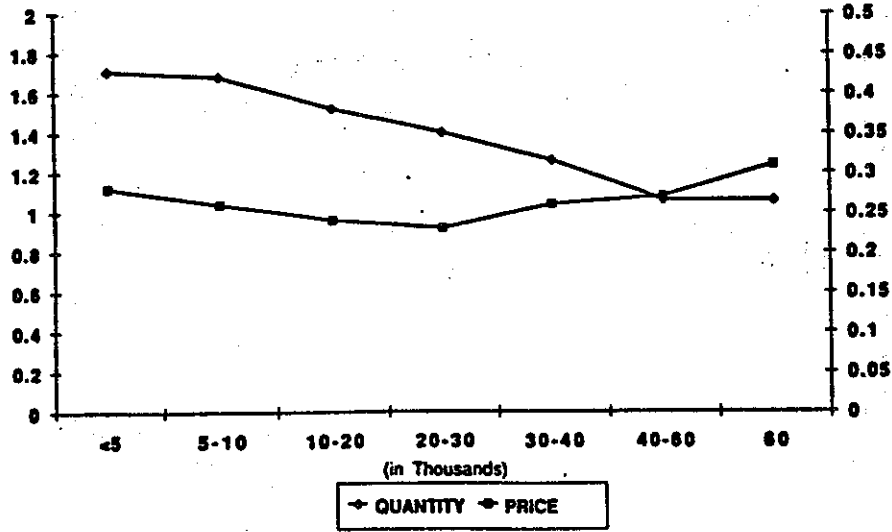


Figure 7. Fresh Potatoes by Household Size

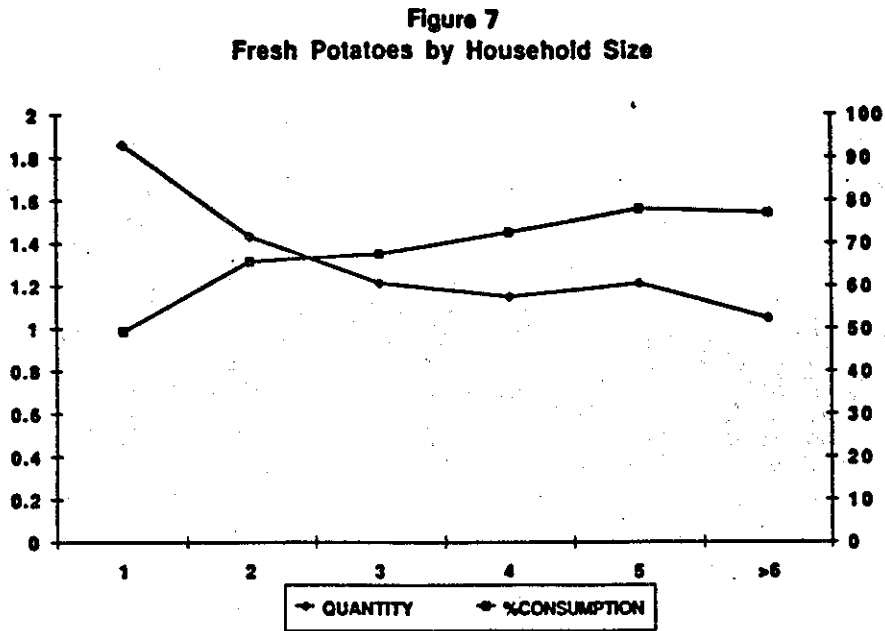


Figure 8. Fresh Potatoes by Division

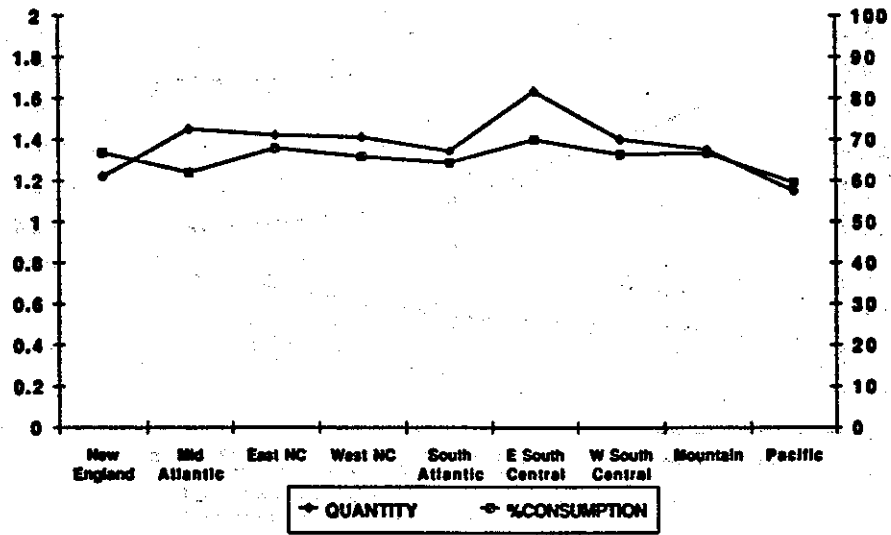


Figure 9. Fresh Potatoes by Household Head Status

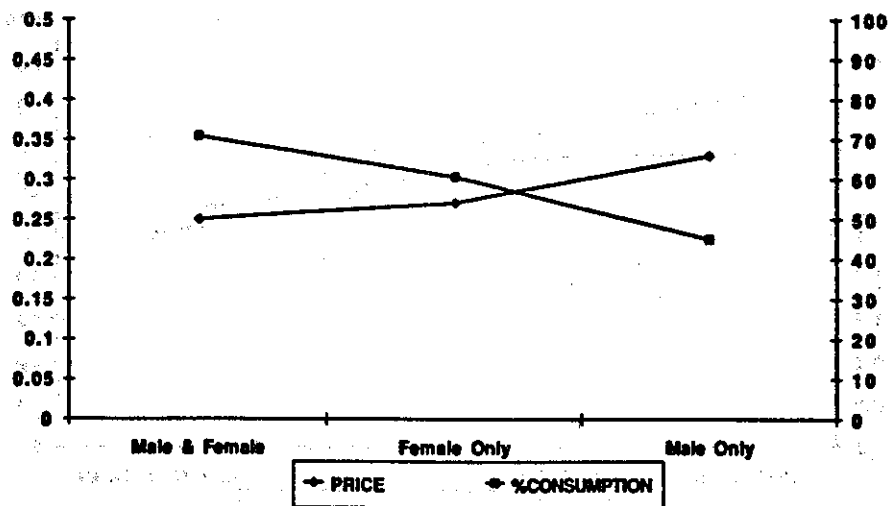


Figure 10. Fresh Potatoes by Household Head Status

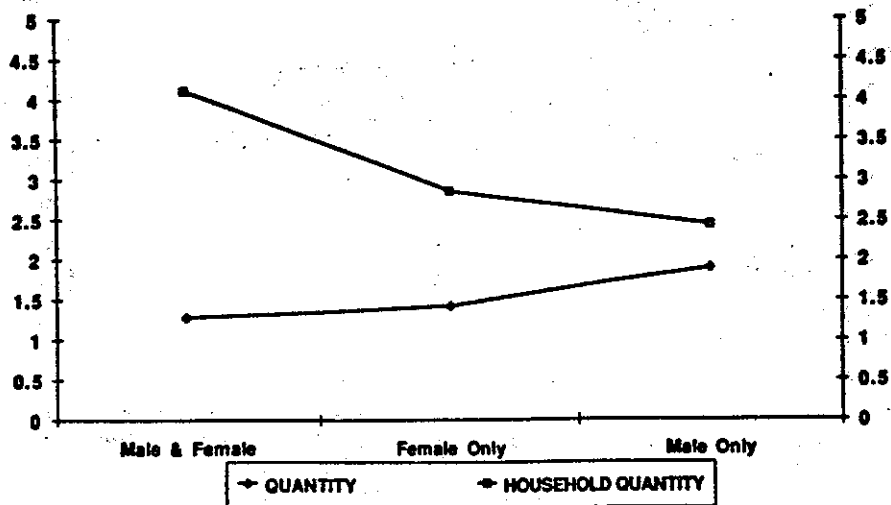


Figure 11. Fresh Potatoes by Education

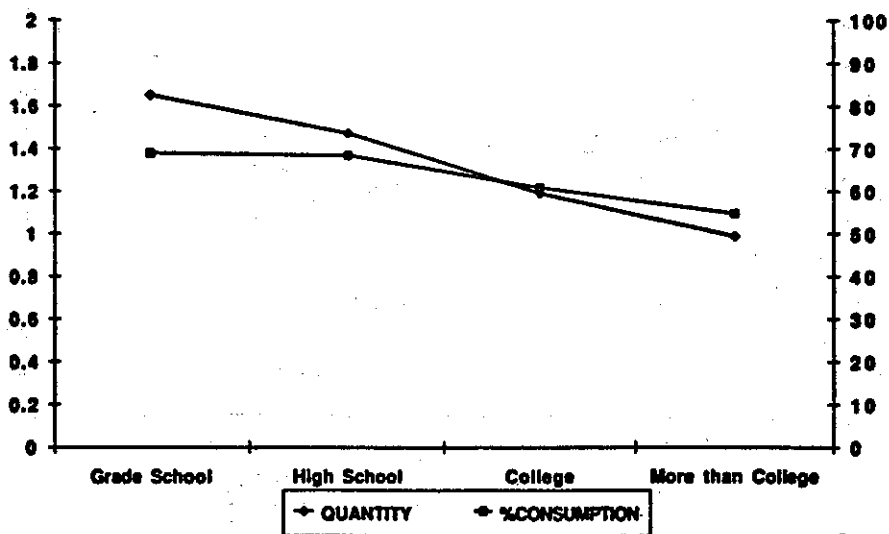


Figure 12. Chips by Household Type

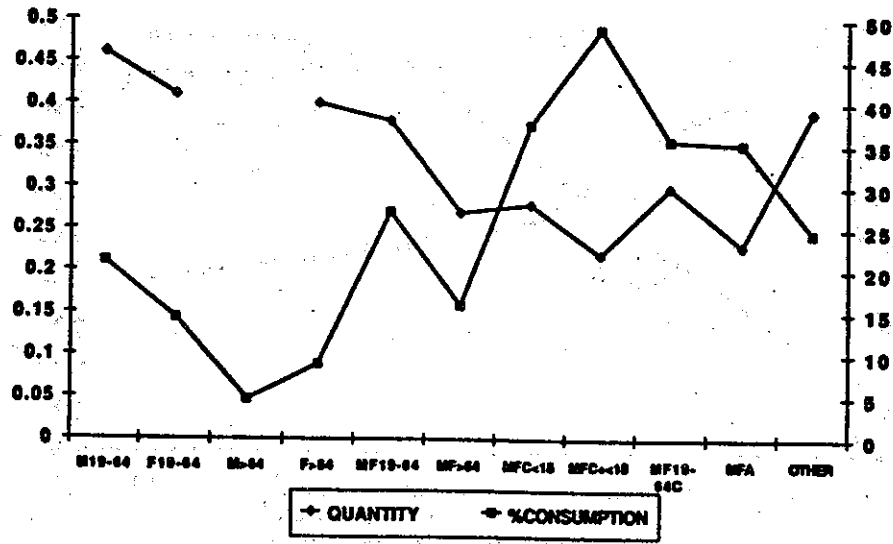


Figure 13. Chips by Income Level

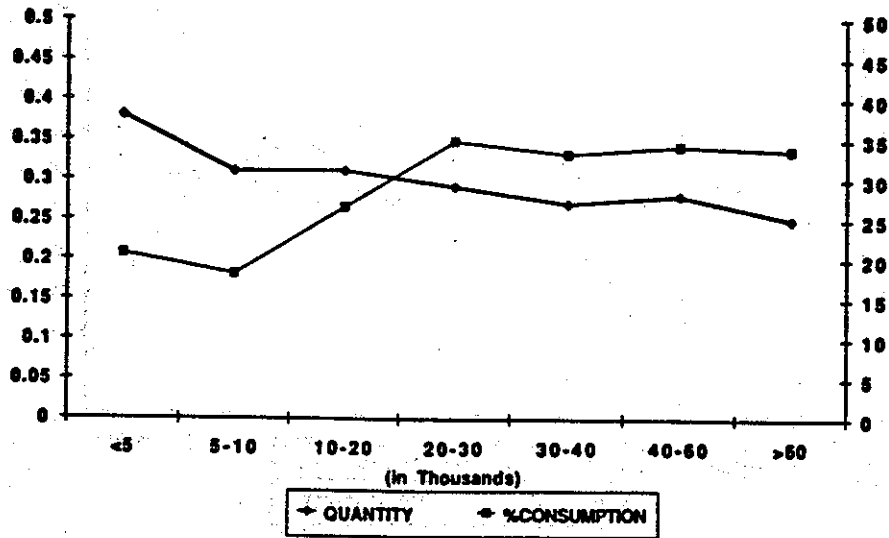


Figure 14. Chips by Household Size

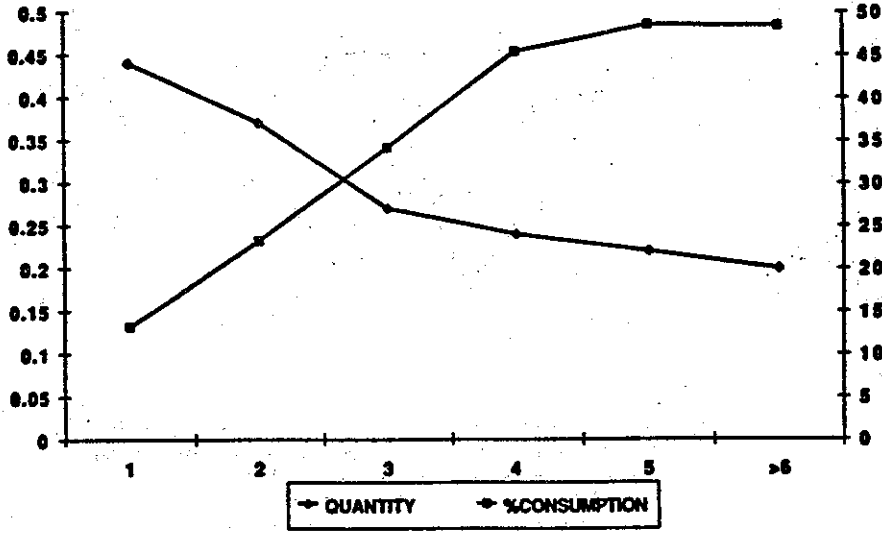


Figure 15. Chips by Division

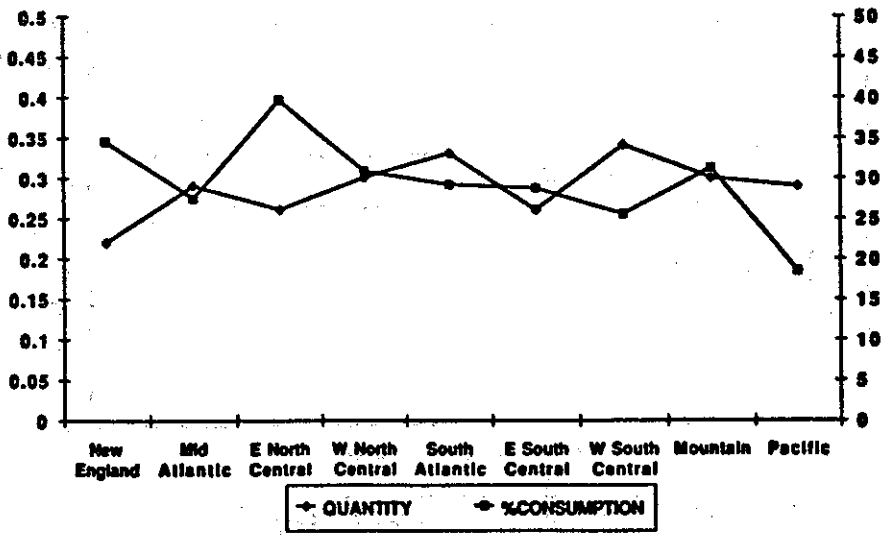


Figure 16. Chips by Household Head Status

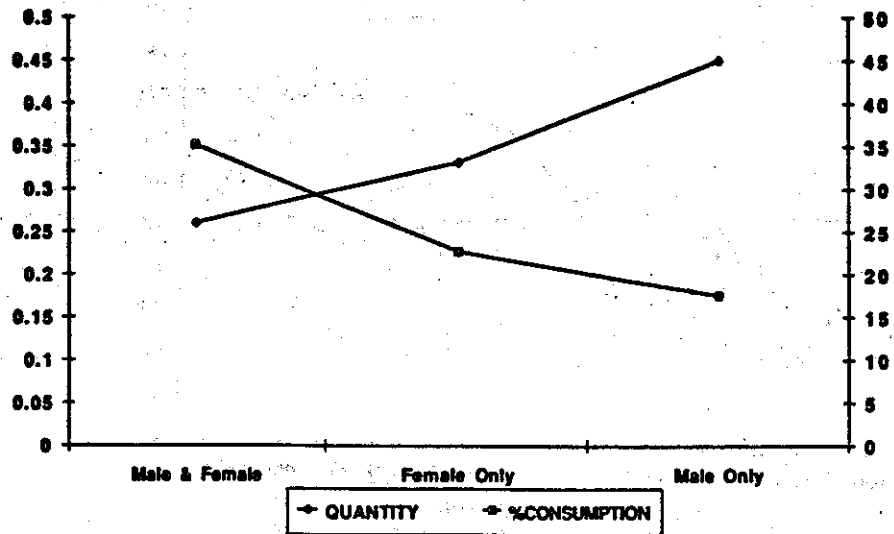


Figure 17. Chips by Education

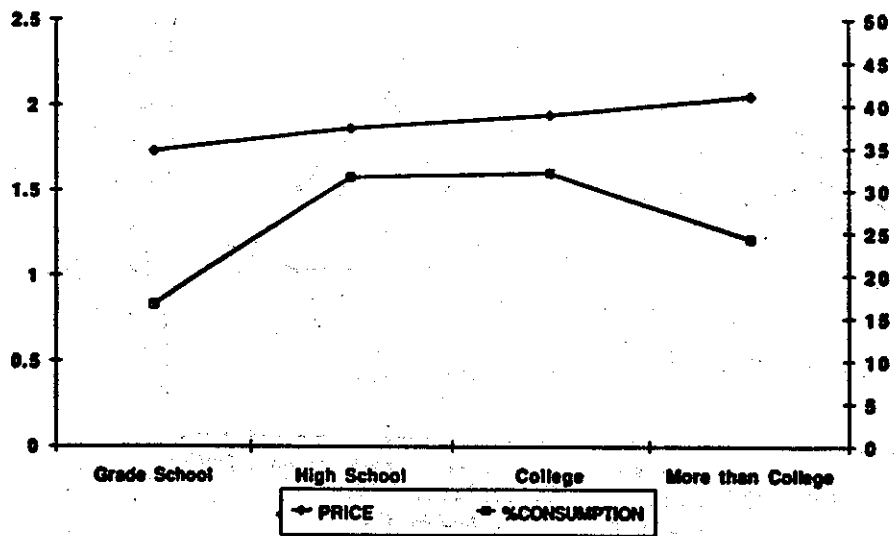


Figure 18. Rice by Household Type

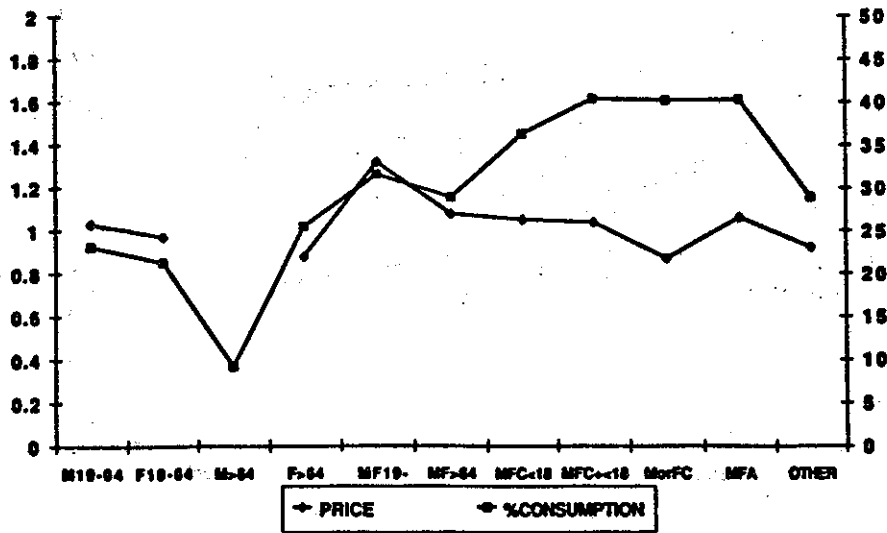


Figure 19. Rice by Division

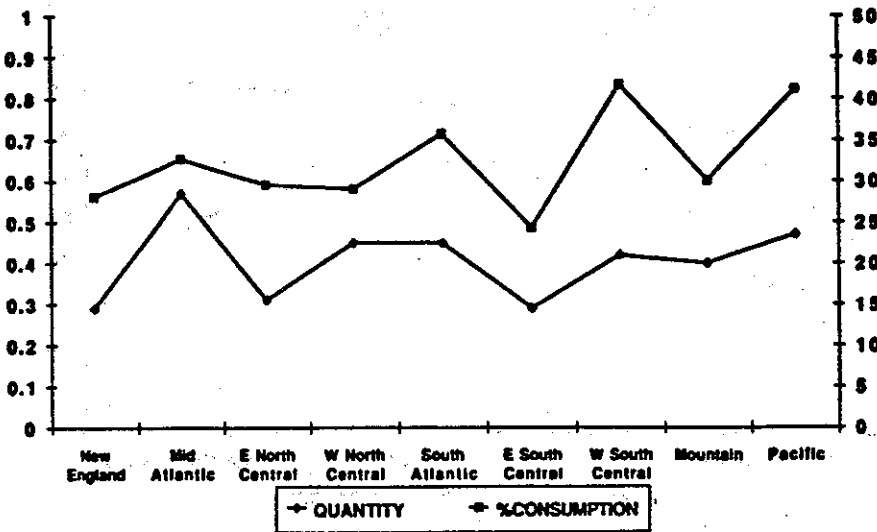


Figure 20. Rice by Race of Respondent

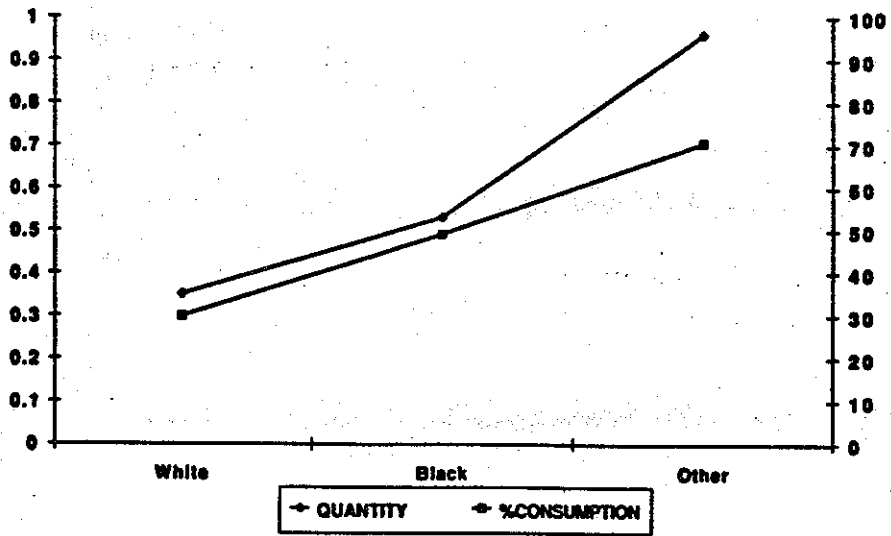


Figure 21. Pasta by Household Type

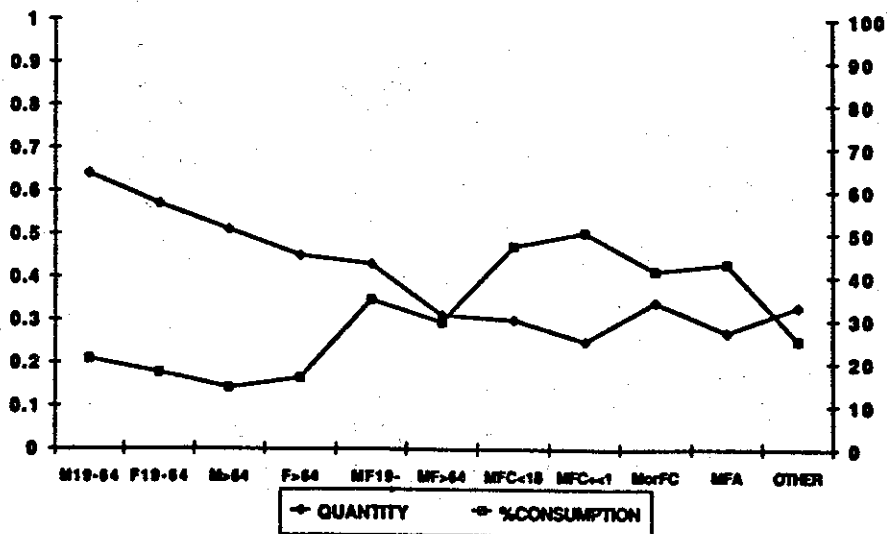


Figure 22. Pasta by Income Level

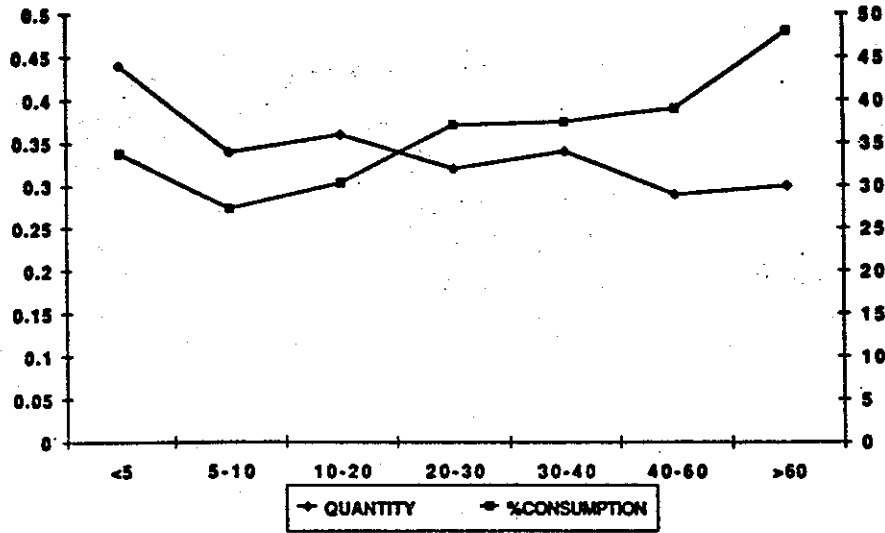


Figure 23. Pasta by Division

