



The Demand for Idaho Potatoes

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During the early 1980s the rule of thumb was that Idaho potato prices would be unprofitable if the crop was larger than 80 million hundredweight (cwt). That rule of thumb was obsolete by the end of the decade. The 1989 Idaho crop was 102 million cwt, and it set Idaho price records.

In 1989 the Idaho Potato Commission decided that a study of future potato demand was needed. The commission provided a grant to the University of Idaho to estimate the demand for Idaho potatoes in 1995. This report provides results of that analysis.

The research was conducted in three parts. First, we developed a mathematical model to determine the main forces that affect the demand for U.S. potatoes. Second, we used the model to predict demand for U.S. potatoes in 1995. Third, we estimated Idaho's share of 1995 potato production.

Factors that influence potato demand

Fresh potatoes

Fresh potato consumption declined for several decades until the 1980s. Health concerns, the convenience of microwave ovens, and potato bars in restaurants have helped halt the decline in fresh potato consumption.

The mathematical analysis for fresh potatoes is summarized in Table 1. The negative sign for consumer income indicates that higher incomes tend to reduce fresh potato demand. The percentage of females in the labor force also reduces fresh potato demand. When women work outside the home they generally reduce their fresh potato purchases.

The growing percentage of homes that have a microwave oven has had a positive effect on fresh potato demand. Only 1.2 percent of U.S. homes had a microwave

Table 1. Factors affecting the demand for U.S. potato products ("+" indicates that as the factor increases, demand increases; "-" indicates that as the factor increases, demand decreases).

Factor	Fresh potatoes	Dehydrated			Frozen		
		Retail	Food service	Potato chips	Retail	Food service	Japan
Price — fresh potatoes	-	+	+		+	+	
Price — dehydrated		-					
Price — potato chips				-			
Price — frozen potatoes			+		-		-
Consumer income	-	+	-	+	+	+	+
Hamburger price					-	-	-
Females in labor force	-				+	+	
Microwave ovens	+	+			-	-	
Meals away from home	+			+	-	+	
Advertising — frozen				-	+	+	
Advertising — dehydrated		+	+				
Advertising — chips				+			
Yen exchange rate							+
Western restaurants in Japan							+

5
3
322
913

oven in 1973. As late as 1977 the figure was only 4 percent. Today, about eight out of 10 homes have one. In fact, now there are more microwave ovens than automatic clothes washers in U.S. homes.

A recent *Good Housekeeping* poll found that nearly 80 percent of microwave oven owners use them to bake potatoes. Had the microwave oven not come to the rescue, demand for fresh potatoes might have continued to decline.

At about the same time that microwave ovens became popular, Wendy's restaurant developed its Hot Stuffed Potato products. Other restaurants soon followed, and fresh baked potatoes moved from a side dish to an entree. This along with U.S. consumers' preference for meals away from home has increased the demand for fresh potatoes.

Economic theory suggests that the prices of substitutes have an effect on demand. Although rice, pasta, and other frozen vegetables were analyzed, no significant substitutes were found for fresh potatoes.

Frozen potatoes

The demand for frozen potato products has been growing for several decades, due mainly to the growth of the fast food industry. Currently about 85 percent of frozen potatoes are sold in the food service sector of the market. The remaining 15 percent are sold in the retail market for at-home consumption.

As U.S. consumers eat more meals away from home, the demand for frozen potatoes increases (Table 1). The demand for retail frozen potatoes declines as people eat out more often. Consumers who eat frozen french fries at restaurants are likely to reduce their frozen potato purchases for at-home consumption.

The microwave oven was a negative factor in both the retail and food service markets for frozen potatoes. Consumers have not been satisfied with microwavable frozen potato products. If a popular microwave product is developed, the microwave oven could turn a negative factor into a positive factor for frozen potato demand.

A rising price of hamburger also has a negative effect on frozen potato demand. Since hamburgers and french fries have become staples in the U.S. diet, their demands have been closely linked. As hamburger prices increase, the demand for frozen potatoes decreases.

A higher price for fresh potatoes was found to have a positive effect on frozen potato demand. Because frozen potatoes are substitutes for fresh potatoes, the demand for frozen potatoes increases when the fresh price increases.

Consumer income and the percentage of females in the labor force also have positive effects. As incomes

increase and as more women enter the work force, the demand for the convenience of frozen potatoes increases.

Frozen potato advertising was also found to have a positive effect on the demand for frozen potatoes. Idaho potato growers should be happy to see frozen potato ads on TV or hear them on the radio because the commercials increase the demand for Idaho potatoes.

Dehydrated potatoes

The food service market for dehydrated potatoes differs from the food service market for frozen potatoes. Fast food restaurants serve large quantities of frozen potatoes, but they seldom serve dehydrated potato products. Much of the dehydrated product moves to the institutional part of the food service market (schools, hospitals, military bases, etc.).

As consumers' incomes increase, retail demand for dehydrated potatoes increases, probably because of the convenience factor (Table 1). The income effect for the food service market, however, is negative.

The positive signs for both fresh and frozen potatoes in the food service market suggest that institutional buyers consider fresh and frozen potatoes as close substitutes for dehydrated potatoes. At the retail level, only the fresh product is a significant substitute.

The microwave oven positively affects the retail demand for dehydrated potatoes. Unlike frozen potato microwave products, microwavable dehydrated products have been popular with consumers.

Advertising of dehydrated potato products was also found to have a significant positive effect on the demand for dehydrated potatoes.

Potato chips

Although Idaho has not traditionally been a large supplier of raw product for potato chips, that may be changing. Some chip companies have come to Idaho for raw product because they have found drought-stricken regions to be unreliable suppliers. Also, many of today's potato snack foods are actually made from dehydrated potato products.

Consumer income, meals away from home, and chip advertising have positive effects on demand (Table 1). Frozen potato advertising has a negative effect. When advertising of frozen potatoes increases, some people substitute frozen french fries for potato chips.

Demand for frozen potatoes in Japan

There has been dramatic growth in the potato export market. Most of the exports have been in the form of frozen potatoes to Japan. During the period when exports to Japan grew rapidly, three factors helped increase Japanese demand (Table 1).

The strong value of the yen compared to the U.S. dollar made U.S. frozen potato products relatively expensive for Japan to import. At the same time, the Japanese economy was booming and consumer income was increasing. This caused Japanese consumers to purchase more convenience foods such as frozen potatoes.

The Japanese food service industry grew rapidly during the same period. Much of this growth was in the fast food sector, as in the United States. McDonald's, Kentucky Fried Chicken, and other U.S. restaurants opened many stores in Japan, and large Japanese fast food chains such as Mos Burger and Lotteria grew rapidly.

The traditional Japanese diet of fresh vegetables, rice, and seafood has apparently been changing. As Japanese consumers developed a taste for western-style foods and as more western-style fast food restaurants opened, the demand for U.S. frozen potato products increased.

In Japan as in the U.S., the price of hamburger was found to have an effect on the demand for frozen potatoes. If Japanese beef import barriers were removed, cheap hamburger-grade beef from Australia could help boost the demand for U.S. frozen potatoes in Japan.

1995 U.S. potato demand forecast

In order to complete the 1995 forecast, we estimated the value of the demand factors. Our 1995 estimate of potato product prices was the average 1970-88 deflated value. We chose this value so that we could forecast the size of the U.S. and Idaho potato crops that could be sold at average prices. Details on estimating the values for the other explanatory variables can be found in University of Idaho Bulletin 734, *Forecasting the Demand for Idaho Potatoes*.

The 1995 demand forecast, based on average deflated potato product prices, was 365 million cwt (Fig. 1). Also in Fig. 1 are the actual sales for 1975, 1982, and 1988. The figure includes the demand for chips and for dehydrated, fresh, and frozen potatoes but not for canned, starch, seed, or livestock feed potatoes. The forecasted quantity for 1995 is 18 percent above 1988's actual quantity.

The estimated market for frozen potato exports to Japan in 1995 was 76 percent higher than actual 1988 exports. This projection assumed that import prices and currency exchange rates would be the same in 1995 as the 1986-87 average.

The next step in the study was to determine the size of the U.S. potato crop needed to meet the total quantity demanded in 1995. Due to shrink and other loss, all potatoes that are produced are not sold. Better storage technology and processing technology have in-

creased the percentage sold (Fig. 2). The 1985 crop was an exception because of severe field frost and resulting storage problems.

Extending the percentage sold trend into 1995, a total U.S. production of 420 million cwt would be sufficient for sales of 365 million cwt for the potato products analyzed (Fig. 3).

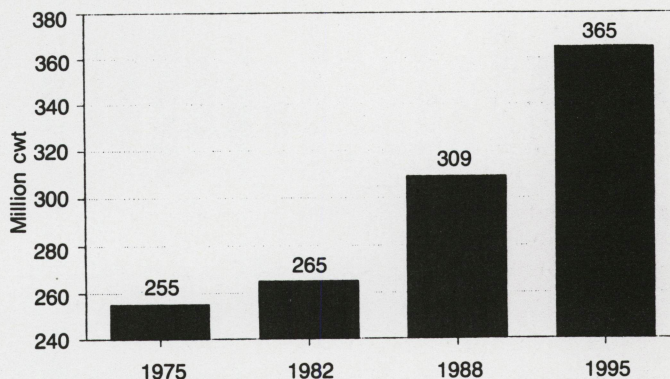


Fig. 1. U.S. potato sales (chips, dehydrated, fresh, frozen). (1995 estimate assumes 1988 price level.)

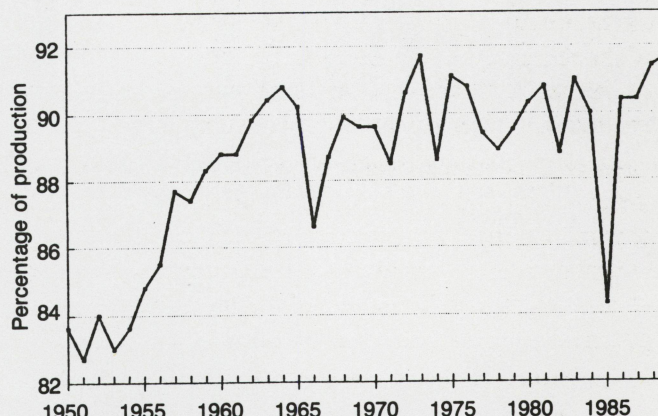


Fig. 2. U.S. potato production sold.

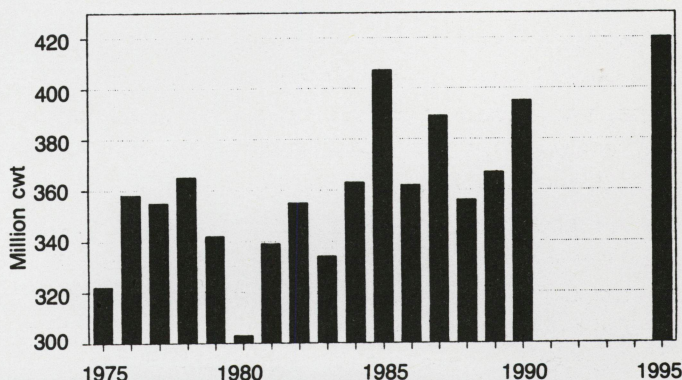


Fig. 3. U.S. potato production. (1995 estimate assumes 1988 price level.)

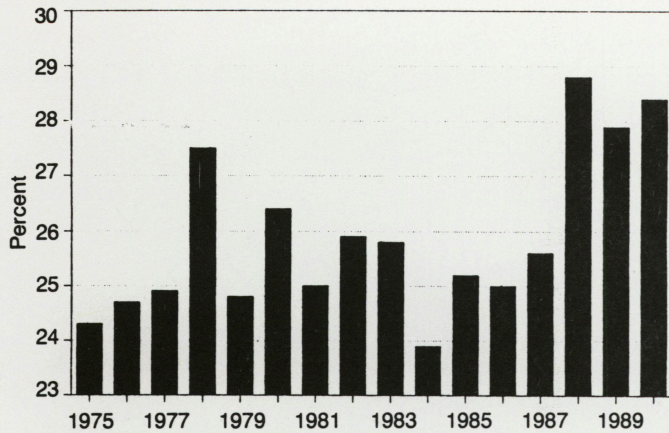


Fig. 4. Idaho's share of U.S. potato production.

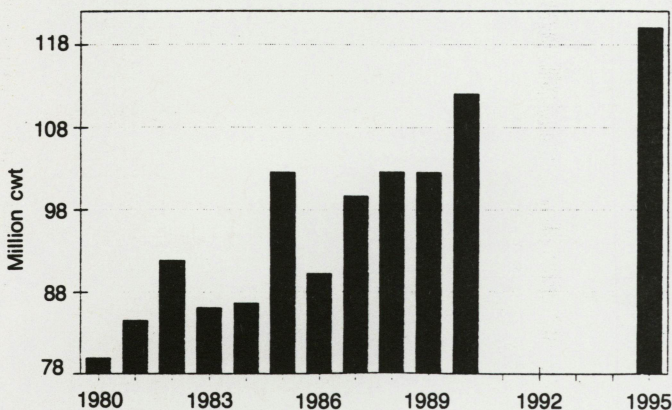


Fig. 5. Idaho potato production (1995 volume assumes 1988 prices and a 28.5 percent Idaho share of U.S. production).

Idaho's share of U.S. production

Since 1975, Idaho's share of U.S. potato production has ranged from less than 24 percent to nearly 29 percent. The average for the period was 25 percent, but the trend was upward (Fig. 4).

Idaho's production for the 1980-90 period, along with an estimate of 120 million cwt in 1995, is shown in Figure 5. The forecast for Idaho assumes production trends will continue and that the state will have a 28.6 percent share of a total 420 million cwt U.S. crop.

The U.S. estimate of 420 million cwt and the Idaho estimate of 120 million cwt are not estimates of what production will actually be. They are estimates of the sizes of crops that could be sold at average prices. Larger crops would bring below-average prices.

Although the forecast is favorable for continued growth of the Idaho potato industry, expansion-minded growers, shippers, and processors should be cautious. The estimated growth rate is less than 3 percent per year.

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