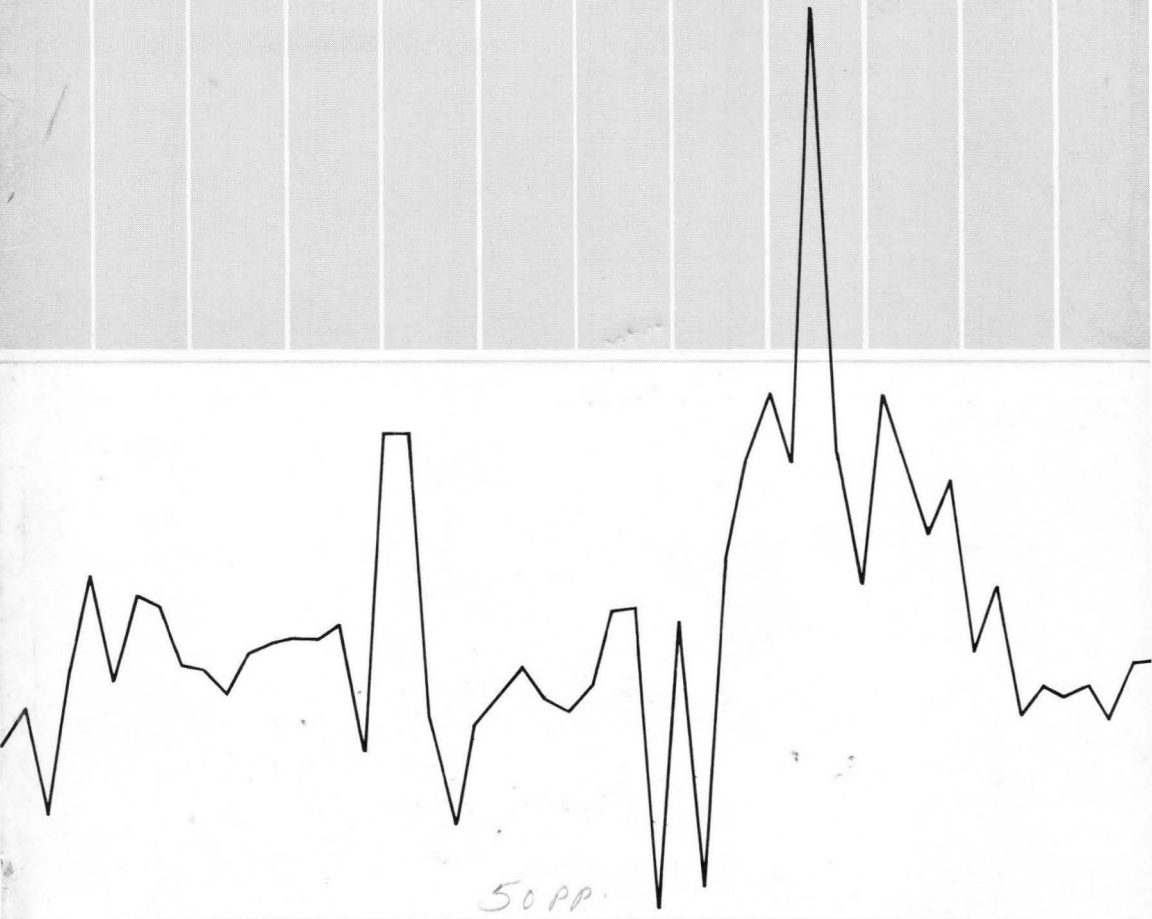
DEMAND ANALYSIS AND MARKET DEVELOPMENT FOR FRESH AND POTENTIALLY GAMMA-IRRADIATED PAPAYA ON U.S. MAINLAND MARKETS

Heinz Spielmann



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ABSTRACT

A market survey conducted in two California test cities on papaya at the retail level reveals that on the mainland papaya is much less price sensitive than supply and display sensitive. All market developmental activity at the present time, therefore, should concentrate on individual store promotions, attractiveness of display, supply sufficiency, rather than mass media promotion (e.g., television, radio, etc.). Market development should at first be concentrated in a relatively small area and eventually be expanded as market experience and popular acceptance of the product develop over time.

To determine the effect that gamma irradiation of the product would have on its market behavior, a telephone survey was conducted, a survey designed to determine popular attitudes toward the consumption of irradiated foods in general. The survey results show that gamma irradiation will have no serious effects on the demand for papaya in the long run.

In the short run a reduction of 23 percent in the demand for papaya would occur if irradiation were to be introduced **at this moment** and if other factors were to remain unchanged. Since a large proportion of those who would refuse to consume irradiated foods would do so solely because of lack of sufficient information and since the number of "hard core" opponents to the process appears to be negligible, the negative short-run effects on the demand for papaya may also be quite negligible. Moreover, these effects will be offset by the benefits derived from shelf-life prolongation and the reduction in spoilage rates of the product. Since supply and display are critical factors in the demand for papaya, the effects of irradiation processing will be to markedly increase this demand through the capability of the retailers to maintain larger supplies.

DEMAND ANALYSIS AND MARKET DEVELOPMENT FOR FRESH AND POTENTIALLY GAMMA-IRRADIATED PAPAYA ON U.S. MAINLAND MARKETS

Heinz Spielmann[1]

PART I: DEMAND ANALYSIS AND PROMOTIONAL EXPERIMENTS

INTRODUCTION

Fresh papaya from Hawaii destined for U.S. mainland distribution must at the present time undergo rigorous treatment for fruit fly disinfestation, for arresting of stem end rot and for possible retardation of enzymic action. Hot water, vapor, and chemicals are presently employed to achieve these ends. However, an alternative and predictably more efficient method of disinfestation and shelf-life prolongation has now been made feasible by gamma irradiation. Proper use of this method would require mass treatment of the product in order to reduce per unit costs and bring them in line with the costs of presently used methods. Since efficient handling and treatment requires also increased and improved distribution, ways and means must be found to achieve this goal. This study concerns itself with the market potential and methods of mainland market development of papaya treated with gamma irradiation.

At the start of this project it was assumed that irradiated papaya would be available for market distribution during the second year of the project's existence. On that assumption, market development would have been discussed first in terms of the non-irradiated product and suitable comparisons would have been made during the second year with irradiated papaya. However, prolonged feeding tests of irradiated papaya are required by the Food and Drug Administration before the product can be licensed for market distribution, and no irradiated papaya was available during the life of this project. This, in turn, required a complete revision of the project plan. To achieve the objective, namely, to assess market development of both the irradiated and non-irradiated product, this study was divided into two distinct parts.

The first part deals with market behavior and developmental activities for the non-irradiated product in two test cities in California. The second part deals with questions of acceptability or non-acceptability of irradiated foods by a sample of the population in the test cities. In this way, at least some inkling may be had of initial changes in the demand for papaya once the

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process of irradiation is introduced and found to be economically feasible. In addition, those steps required for a continued orderly market development of the irradiated product can be more clearly determined. Before a discussion of the methods and findings of this project, the following short historical account is presented.

Among the diversified crops[2] produced in Hawaii, papaya is the third most important in terms of value of production. Only coffee and, more recently, macadamia nuts exceed that value. Papaya production since the end of World War II has increased 14 percent annually. Since 1947, a part of the total production was shipped to the mainland, starting with a modest 2,000 pounds. In contrast, at the present time (1966), shipments to the mainland amount to about 5.6 million pounds. Since 1961, the bulk of papaya exports to the mainland has been by air. The high cost of air transportation was more than offset by the reduction in loss due to spoilage and the prolongation of shelf life in mainland stores. Papaya shipments are destined mainly for California although a small quantity is trucked to other Pacific Coast states and to Denver, Colorado, or flown to the Eastern Seaboard.

As can be seen in Table 1.1, bearing acreage, total acreage, and yield per acre have steadily increased since 1950, and so has total output, which has nearly tripled from 1950 to 1965. Similarly, even after correcting for a change in the value of the dollar since 1950, total value of the papaya crop has tripled in the 15-year period under consideration. Shipments to the mainland have gained increasing importance, amounting to about 20 percent of total production at the present time.

Since 1960 the papaya industry has conducted market development and promotion activities ranging in financial outlays from about $26,800 in 1960 to $48,000 in 1965. These activities were mainly promotion through contacts with food editors of newspapers, radio and television stations, and through in-store demonstrations. The effects of these promotion activities on mainland shipments will be discussed in a later section of this report.

METHODOLOGY

To establish the market behavior of papaya on the mainland and to evaluate the impact of market development activities on that market, two test areas in California, Sacramento and Redlands, were selected. The selection was made on the ground that (1) California would logically be the first major market for papaya, (2) the areas are compact and well adapted for testing purposes because of the variety of their retail outlets, and (3) a cross-section of the population of these areas is fairly representative of metropolitan areas throughout the country. In these cities, retail outlets were selected on the basis of size, structure, and location. Care was taken to select participating retail outlets from areas of diverse income strata, so that some are part of chains while some are single proprietory units.

[2] "Diversified crops" is defined as all agricultural crops produced in Hawaii except such plantation crops as sugar cane and pineapple.

Enumerators in both test areas were furnished a set of schedules for weekly inventories of papaya disappearance, prices, display, product conditions, and promotion activities for papaya carried on by participating stores. Similar information was collected for fruits believed to be competing directly with papaya, namely cantaloupe, banana, grapefruit, orange, and fresh pineapple.

The schedule form also included information on the condition of the papaya at the time of the inventory. The number of losses due to spoilage was recorded and the enumerators were instructed to grade papaya according to color and degree of ripeness and to record that information on the schedule. They also were asked to report on the papaya display in the stores—place of display, type of display, originality, color, etc.

Ten stores participated in the survey in Sacramento and 14 participated in the Redlands-San Bernardino-Riverside area. During the survey period, two television advertisements consisting of 10 spots each were introduced in Sacramento and one radio program was broadcast in the Redlands-San Bernardino-Riverside area. In addition, two one-page articles pertaining solely to papayas and their preparation appeared in a daily newspaper, The Sacramento Bee. All newspaper advertisements pertaining to papaya sales by participating stores were recorded and their effects noted.

All information contained on the schedules was transferred to IBM cards and a graphic presentation, particularly of price-quantity relationships on various price levels, was prepared. Since data for only one year were fully available, the time from October 1965 to and including October 1966 was chosen for more intensive analysis. This analysis, which follows, deals first with market behavior of papaya in Sacramento, then in the Redlands-San Bernardino area, and finally with characteristics of both markets combined.

Unfortunately, it was not possible to make controlled in-store experiments, first, because the product is highly perishable, secondly, because it is relatively expensive, and thirdly, because it has a high spoilage rate. None of the participating stores appeared prepared to cooperate with pricing or quantity controlled tests. As it turned out, however, the variability of prices in some stores, the price constancy in others, the high rates of advertisement by some stores and practically none by others, made meaningful comparisons possible.

For example, two Sacramento stores maintained a constant price of 49 cents per unit (piece) throughout the entire year of observation; these stores were used as "control" against those which changed prices of papayas frequently throughout the study period. Similarly, while some stores maintained a continual flow of papaya supplies, others did not. Again, suitable comparisons could be made under such conditions. Those stores in which product prices had not changed during the survey period provided a clearer insight into the effect that promotion may have on the demand for papaya than would have been possible had all stores employed variable pricing practices.

Table 1.1 Hawaiian papaya production and distribution: Acreage, production, yield per acre, value, shipment to mainland, 1948-1966*

Year	Acreage			Production	Yield per acre	Value	Shipment
	Bearing	Non-bearing	Total				
	ACRES	ACRES	ACRES	1,000 POUNDS	1,000 POUNDS	1,000 DOLLARS	1,000 POUNDS
1948	372	175	547	7,100		339	2
1949	366	161	527	5,885		383	28
1950	435	316	751	7,950	19.7	321	286
1951	355	167	522	5,775	16.3	320	313
1952	320	247	541	7,055	21.5	465	331
1953	406	192	598	9,240	22.7	499	774
1954	464	188	652	10,885	23.5	629	1,853
1955	401	159	560	9,180	22.9	708	955
1956	432	313	745	10,735	24.8	708	1,568
1957	543	310	853	15,040	27.7	802	2,457
1958	610	226	836	15,365	25.2	819	2,430
1959	537	279	816	14,395	26.8	786	2,133
1960	512	244	756	12,025	23.4	743	1,067
1961	566	332	898	15,760	27.8	849	2,738**
1962	520	420	940	14,480	27.8	809	3,320**
1963	460	600	1,060	13,930	30.3	1,042	3,196**
1964	750	600	1,350	24,585	32.8	1,142	4,436**
1965	780	390	1,170	21,710	27.8	1,277	4,939**
1966							5,653**†

*Hawaii Crop and Livestock Reporting Service, Hawaii State Department of Agriculture.
**Air shipments. (While some surface shipments continued after 1961 they were negligible.)
†Estimated.

OBSERVATIONS AND FINDINGS

Sacramento

Papaya prices on the Sacramento retail market varied considerably over time and from store to store, ranging from 29 to 79 cents per pound.[3] As indicated in Chart 1, which shows papaya sales at various price levels, it is not uncommon to find that more papaya were purchased at the 59-cent level than at the 49- or 39-cent level during any given week. This is partly because stores may have offered papaya predominantly at the higher price level and partly because shoppers do not purchase papaya on a price basis alone. Shoppers do not, in fact, shop for papayas but pick them up mainly on impulse if they are offered at the store.

A similar picture is indicated in Chart 2, which shows that peaks and troughs occur fairly concurrently on all price levels. Note, for example, how the increase in quantity taken off the market during weeks 17 and 18 occurs on all four price levels (e.g., at 39, 49, 59, and 69 cents). Some of this coincidental movement is due to supply availability. That is, if total supplies from Hawaii increase, sales increase at **all** price levels. Conversely, a product shortage, as recorded in February (week 21), reduces product offerings, also on all price levels.

Frequently, newspaper advertising of papaya or some promotion on tropical fruits by one store will induce increased purchases in other stores and at different price levels. Note that in the 39th week, sales increased at the 49-cent level in response to an advertisement by one store. They also increased at the 59-cent level and the week thereafter at the 69-cent level in other stores.

The graphic presentation shows that changes in retail papaya sales are not due primarily to price changes but more to factors such as available supplies and advertising activities of individual stores. Before a more detailed discussion of those relationships affecting the quantity of papaya sold, a brief note will be made on display and condition of the product in various retail outlets.

Since papayas are highly perishable, the degree of freshness and keeping quality depends on the time elapsed since harvest. In-transit time by air transport rarely exceeded three or four days. Two or three days may be required in wholesale storage and retail handling before actual sale. Spoilage loss of papaya varied from 6 percent of total store purchases in January to 33 percent in July and August. Some of this loss was due to faulty handling by the retailer. Papayas were frequently unfavorably displayed. They were often found in a paper carton hidden in paper wool and located in areas difficult to find. Relatively high losses prompted some store managers to increase the price of the product in order to make up the loss incurred. This practice frequently turned out to be self-defeating. More damaging was the practice, not too widespread, of marking down already spoiled papaya from, say, 49 to 15 cents.

[3] Since the average weight per papaya was about 1 pound, the terms "per unit" (i.e., per papaya) and "per pound" can be used interchangeably.

Chart 1. Sacramento: Sales at various price ranges, all stores (T = weeks and months)

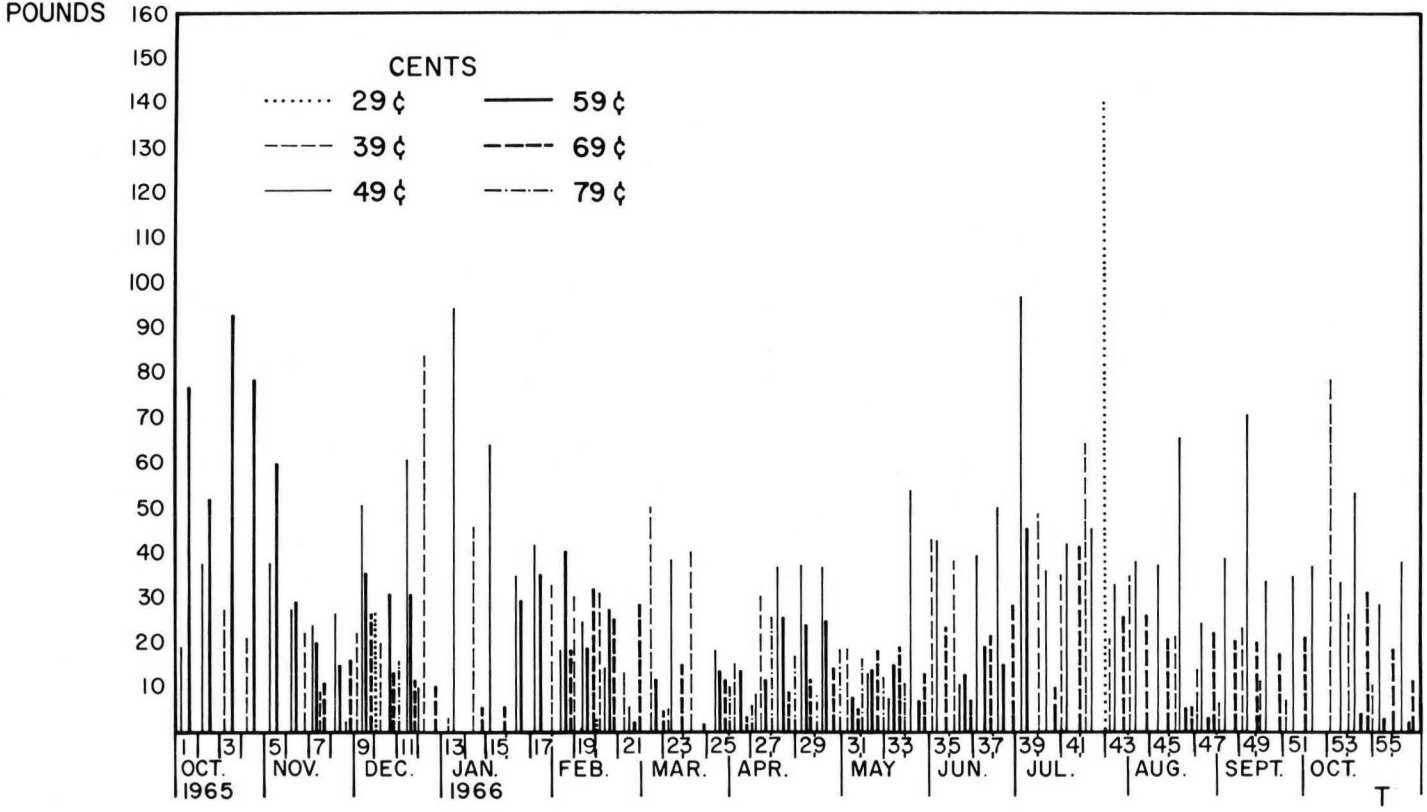
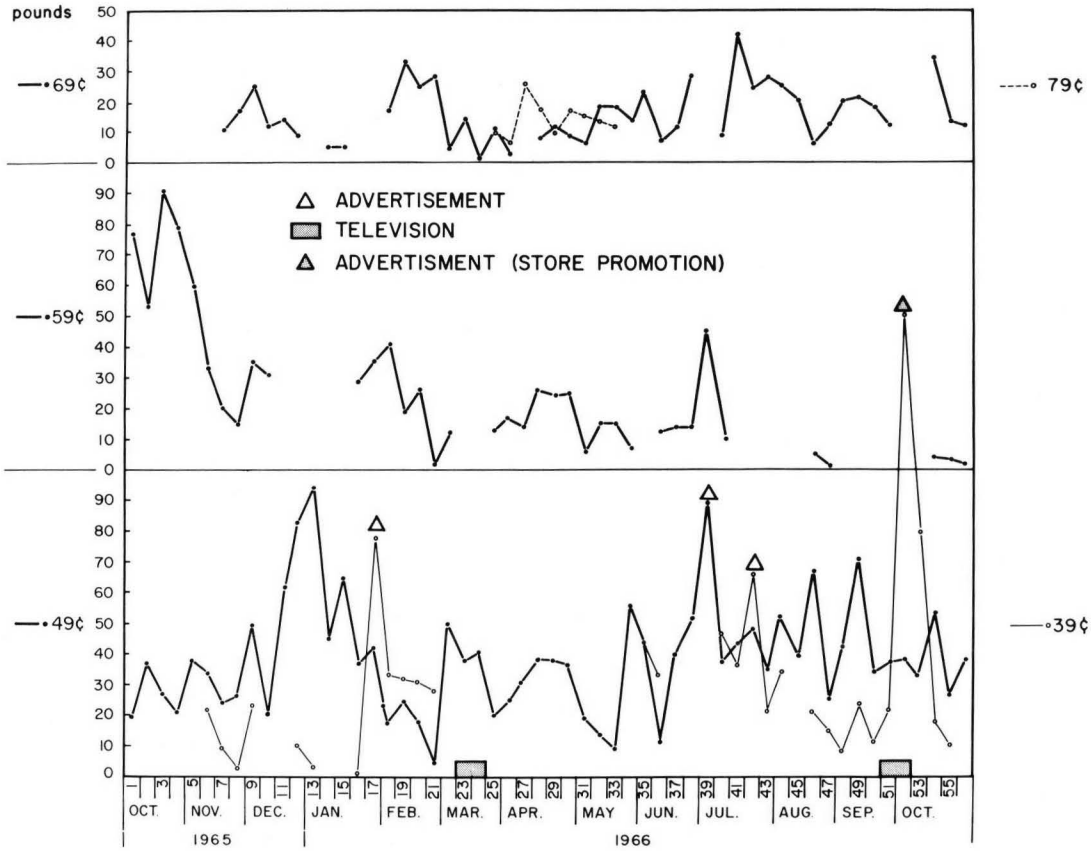


Chart 2. Sacramento: Sales (quantity) fluctuations at 5 price levels, all stores



ANALYTICAL FRAMEWORK[4]

Disclosures from the graphic analysis of data led to the hypothesis that the impact of price on the quantity of papayas sold is quite negligible. A regression of price on quantity sold in Sacramento's retail market shows the following:

Equation 1

$$X_1 = 2.63859 + \underset{(9.93762)}{0.144257X_2}$$

where: 2.63859 is a constant
X_1 = Quantity of papaya sold (Sacramento, retail)
X_2 = Price of papaya

The figure in parenthesis = T. The degrees of freedom were 689 and the $R^2 = 0.123948$.

While this relationship is significant at the 1-percent level, R^2 indicates the rather negligible degree of change in the quantity of papaya sold attributable to the price variable.

Note should be made of the following: (1) In the equation under consideration, quantity sold is the dependent variable. In demand analysis price is usually used as the dependent variable. However, quantity sold was chosen for much of this analysis because it is the critical variable. The investigation of market developmental steps is thus primarily concerned with changes in product quantities rather than in price. (2) The quantity-price relationship is positive. While this is not a "normally" expected result (quantity-price relationships should be negative in demand analysis), a glance at the coefficient of regression of X_2 indicates that the slope of this function is almost zero. As will be seen later, the addition of one variable to this equation produces the expected negative quantity-price relationship.

The supply of papaya available in the store is of much greater importance to the quantity of papaya sold than price, as is shown in the following equation:

Equation 2

$$X_1 = 0.925217 - \underset{(-0.77891)}{0.01787X_2} + \underset{(4.28812)}{1.71224X_3} + \underset{(23.0866)}{0.44724X_4} + \underset{(0.25065)}{0.00376X_{17}}$$

where: X_1 = Quantity sold (average weekly)
X_2 = Retail price
X_3 = Wholesale price of papayas in San Francisco
X_4 = Supply of papayas in the store (average weekly)
X_{17} = Week
$r_2 = 0.3521$ $r_4 = 0.6991$
$r_3 = 0.3998$ $r_{17} = 0.2601$

[4] Readers who do not wish to follow the analysis contained in this section are referred to its summary on page 19.

Numbers in parenthesis are T. The variables x_3 and x_4 are significant at the 1-percent level. For the whole equation $R^2 = 0.52782$. The size of both T and r (partial regression coefficient) as they pertain to variable x_4 (supply of papaya) indicates the importance of this variable relative to all other variables in the equation.

To obtain a fuller picture of the influences affecting the quantity of papaya sold at retail, a set of additional variables was introduced and their significance tested. In equation 3, the variables special advertising, product condition, display, television contribution, and time were added to equation 2. The impact of these variables on product disappearance is not very large ($R^2 = 0.5918$). In equation 1A, Appendix A, prices and supplies of the competing fruits on which data were taken have been added to the set of variables. The resultant $R^2 = 0.621$. It is clear that these variables do not contribute very much to changes in the quantity of papaya sold at retail. The variable X_4 (supply of papaya at the retail store) has a greater impact on quantities sold than any other variable or any combination of variables. Other statistical experiments made to obtain a better explanation for product disappearance did not contribute markedly toward that end. Tests for seasonality, for example, by squaring and cubing X_{17}, (the time variable), yielded very little improvement. Since graphic presentation of the quantity-price relationship showed some curvilinearity in the demand function, the variable X_2 (price of papaya) was squared. However, the resulting R^2 did not improve much beyond the 0.625 level achieved in previous experiments.

Equation 3

$$X_1 = \underset{}{0.6458} \underset{(-1.21463)^*}{- 0.027X_2} \underset{(3.6693)^*}{+ 1.416X_3} \underset{(16.9884)^*}{+ 0.348X_4} \underset{(8.977)^*}{+ 12.931X_{13}}$$

$$\underset{(0.0372746)}{+ 0.021X_{14}} \underset{(3.94897)^*}{+ 3.027X_{15}} \underset{(2.60306)^*}{+ 4.0054X_{16}} \underset{(-0.514917)}{- 0.0074X_{17}}$$

where: X_1 = Quantity of papaya sold
X_2 = Price of Papaya
X_3 = Wholesale price of papaya at San Francisco
X_4 = Papaya supply at store
X_{13} = Special advertising (newspaper ads, store promotion)
X_{14} = Condition of papaya
X_{15} = Display
X_{16} = Television contribution
X_{17} = Week
R^2 = 0.591809
F = 125.229 (significant at the 1-percent level)
D.F. = 691

Figures in parenthesis are T.

*Means significant at the 1-percent level.

The relatively low level of R^2 in equation 1A, Appendix A, indicates that a number of factors other than those included have an effect on the disappearance of papaya at the retail level. It can be assumed that among these unexplained variables, per capita income and changes in taste may be of considerable importance. The former was not included because of the shortness of time involved in the analysis, the latter because it is not readily quantifiable.

The effect that prices of the competing fruits, such as cantaloupe, banana, grapefruit, etc., have on papaya sales is quite negligible, as shown in equation 1A, Appendix A. Only the prices of white grapefruit and banana seem to have some significant effect. Since both have positive coefficients a competitive relationship is indicated; (as price of competing products increases, more quantity of a given product is sold). It is not possible, however, to know exactly why this particular relationship prevails. In this analysis the relationship is important since it may indicate the location of an advantageous shelf position for papayas in individual stores. The present predominant shelf position of papaya is next to avocado (as reported by our enumerators). This analysis suggests that papaya would be much better placed in the vicinity of grapefruit or banana because of their directly competitive relationship.

Redlands-San Bernardino-Riverside Area

Price variations in the Redlands-San Bernardino-Riverside area were not nearly as great as in Sacramento. They ranged from 29 cents (occasionally four for $1.00 or three for $1.00) to 49 cents. The predominant price among the participating stores was 39 cents. Chart 3 shows that after June 1966 the 49-cent price line completely disappeared and the price shifted toward the 39- and 25-cent line. Retailers in this area are more active in papaya promotion with relatively good success. Much larger per store sales volume was recorded here than in Sacramento. On the average, participating stores in the Redlands-San Bernardino-Riverside area sold about three times the quantity of papaya sold in Sacramento.

The general market behavior does not differ markedly between the two areas. In the Redlands area, the effect of price on the quantity sold was as low as in Sacramento. A regression of X_2 (Retail price of papaya) on X_1 (quantity of papaya sold) produces the following results:

$$X_1 = 4.13014 + \underset{(14.4288)}{1.08169X_2} \qquad R^2 = 0.1393$$

T (number in parenthesis) is significant at the 1-percent level. Note here that the quantity-price relationship is positive, which may be ascribed to the fact that this is not a demand function in a free market environment. Prices are administered by store management and set, as it were, irrespective of consumer response or product supply. There is evident, as in Sacramento, a considerable degree of price confusion. Consumers do not have, at this time, an established price awareness regarding papaya. Eventually, as time goes by and consumers become more acquainted with the product, a distinct price pattern will emerge. Present-day determination of retail papaya price will be discussed later.

Introduction of two additional variables (wholesale price, Los Angeles, and store supply of papaya) yields a negative coefficient of correlation for the price variable. Equation 4 shows, as in the Sacramento case, that the store's supplies of papaya are the most important determinant of quantity of papaya sold in the retail market. Looking at equation 2A, Appendix A, we note that in the Redlands area also, white grapefruit is the one product that maintains a significant competitive relationship to papaya. However, as in Sacramento, the price of competing products and their quantity have very little impact on the market behavior of papaya.

Equations 5, 6, and equation 3A, Appendix A, generalize the factors which affect the demand of papayas in both areas (Sacramento and the Redlands-San Bernardino-Riverside area). As indicated in equation 5, the effect that price has on total sales on the retail level is negligible and the quantity-price relationship again is positive. Price simply is not an important determinant of quantity of papaya sold in either of the retail markets.

The most pronounced impact on quantity sold is, again, the supply of papaya on hand. In equation 6, $R^2 = 0.6817$; the T is significant at the 1-percent level. The summary of the total equation as shown in equation 3A, Appendix A, bears out the market behavior of papaya as demonstrated in both areas. If all other factors are included, the quantity-price relationship conforms more nearly to the normal demand behavior. Supply available at the retail store is the most prominent contribution to changes in the quantity sold. The combined demand function shown in equation 3A, Appendix A, confirms the significance of the competitive relationship between the prices of white grapefruit and the quantity of papaya sold, a relationship noted in both Sacramento and Redlands.

Variables X_{13}, X_{14}, and X_{15} dealing with special advertising, condition of the product, and display need special mention here. All three are shown to be significantly related to the quantity sold (at the 1-percent level). The negative sign before the coefficient of correlation of X_{14} (condition of product) is due to the coding system employed—that is, a good condition is 1, bad condition, 2. The high degree of significance of these three variables bears out the fact that papayas are purchased on impulse and that display, product condition, and special advertising have a particularly critical effect on total sales.

Equation 4

$$X_1 = 0.432 - \underset{(-0.810)}{0.143X_2} + \underset{(0.398)}{0.937X_3} + \underset{(44.954)*}{0.832X_4}$$

For identification of variables refer to equation 3.
(X_3 = Wholesale price at Los Angeles)

$R^2 = 0.687$ $\quad r_2 = 0.373$
$D.F. = 1284$ $\quad r_3 = 0.421$
$F = 937.344$ $\quad r_4 = 0.826$

*Significant at the 1-percent level.

Equation 5

$$X_1 = 8.622 + \underset{(9.193)*}{0.399X_2}$$

$R^2 = 0.04081$ $D.F. = 1986$ $F = 84.506$

where: X_1 = Quantity of papaya sold
X_2 = Price

*Significant at the 1-percent level.

Equation 6

$$X_1 = 2.763 + \underset{(65.216)*}{0.857X_4}$$

where: X_1 = Quantity of papaya sold
X_2 = Supply of papaya in store

$R^2 = 0.6817$ $D.F. = 1956$
$F = 4253.11$ (significant at the 1-percent level)

*Significant at the 1-percent level.

Equation 7

$$X_2 = 25.019 + \underset{(9.193)*}{0.102X_1}$$

where: X_1 = Supply of papaya at stores
X_2 = Price

$R^2 = 0.04081$
$D.F. = 1986$
$F = 84.506$

Figures in parenthesis = T

*Significant at the 1-percent level.

Equation 8

$$X_2 = 1.057 - \underset{(-2.604)*}{0.0210X_1} + \underset{(99.607)*}{14.669X_3} - \underset{(4.604)*}{0.0387X_4}$$

where: X_1 = Quantity sold
X_2 = Price
X_3 = Wholesale price (combined)
X_4 = Supply of papaya in stores

$R^2 = 0.842$
$D.F. = 1984$

*Significant at the 1-percent level.

In the two markets under investigation combined, prices and supplies of competing fruits contributed very little to changes in quantity of papaya sold. A multiple correlation analysis was made of the combined demand for papaya in which **price of papaya** was made the dependent variable, leaving as independents all other variables, including the quantity sold. As would be expected, the price-quantity relationship has the same characteristics as the quantity-price relationship shown previously (equation 7). However, equation 8 shows a strong correlation between the retail price and the wholesale price of papaya. The $R^2 = 0.842$; F is significant at the 1-percent level; and the T (figures shown in parenthesis) are significant at the 1-percent level. Similarly it appears that papaya prices moved with prices of competing fruits, as is shown in equation 4A, Appendix A. Note that the price of white grapefruit has a negative coefficient of correlation, showing again the competitive relationship that exists between these two fruits. A somewhat better fit ($R^2 = 0.921$) is shown in equation 5A, Appendix A. Note that the price-quantity relationship, while negative, has practically no slope. The prices of competing products, as well as the supplies of banana, fresh pineapple, and grapefruit, significantly influence the price of papayas. Note, finally, that variables X_{13}, X_{14}, and X_{15}, which exerted significant influence on papaya sales, are not significantly affecting the price of the product.

In summary, it is quite evident that the retail price of papaya is directly influenced by (a) the wholesale price of papaya and (b) the price of some of the competing fruits. It will be the subject of additional research to evaluate the pricing decisions made by retailers as well as decisions on supply and inventory maintenance of papaya. Findings based on our analysis of the demand behavior of the product lead to the following conclusions:

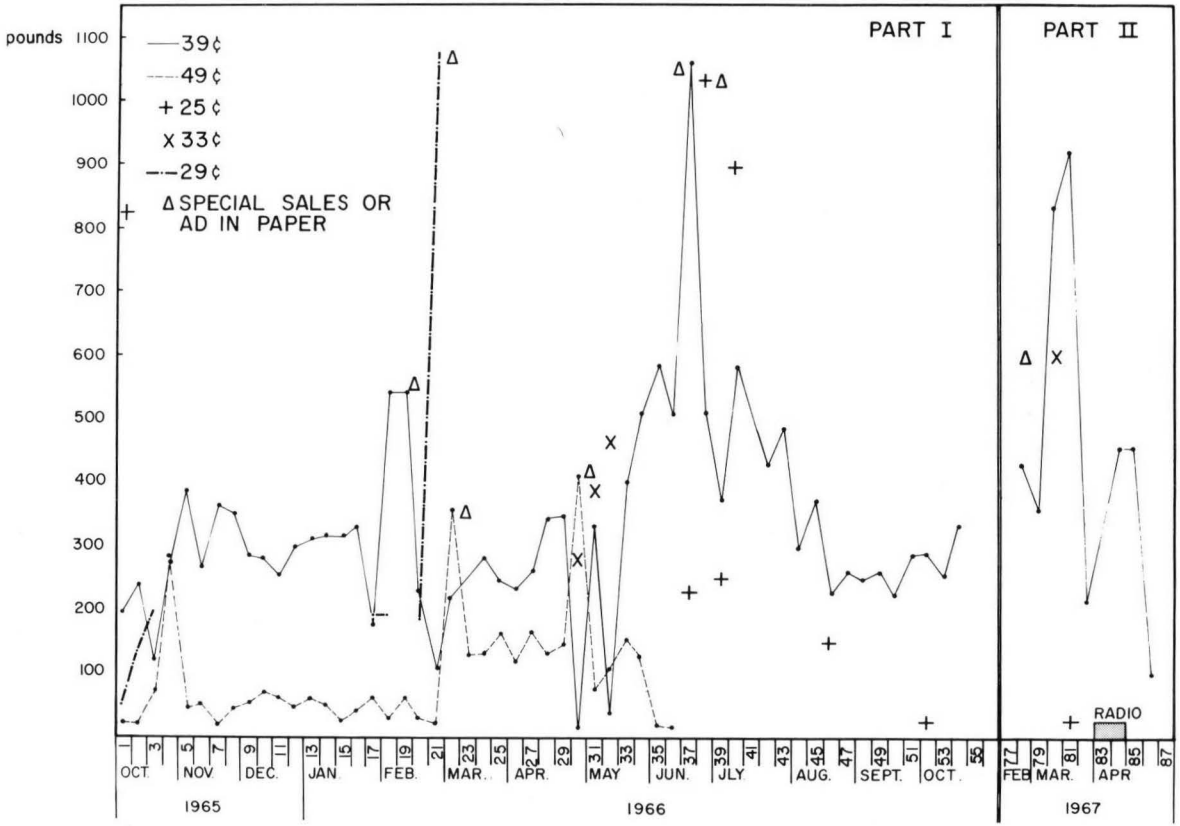
(1) Papayas are an "impulse" item and hence must be well displayed and in large quantities.

(2) Price sensitivity is likely to be low as long as the product is still a novelty; (papayas are frequently used as loss leaders).

(3) Since there exist some significant competitive relationships between papaya and white grapefruit, perhaps also banana, papaya should be displayed in the vicinity of these fruits.

(4) Papaya demand is more sensitive to display and product condition than to price. In addition, quantity of supply affects demand at the retail level much more strongly than price, since large displays of merchandise in general affect the disappearance rate of "impulse" items.

Chart 3. Redlands-San Bernardino-Riverside: Papaya retail sales fluctuations at 5 price levels (Oct. 1965 Oct. 1966 and Feb. 1, 1967 Apr. 30, 1967)



MARKET DEVELOPMENT OF PAPAYA

Since 1960 the Hawaiian papaya industry has been engaged in its own efforts to develop the mainland market. Table 2.1 shows shipments of papaya to the mainland and expenditures by the industry for promotion. These activities have consisted primarily of establishing contact with food editors of major newspapers, radio and television stations, not only on the West Coast but also in various other parts of the country, particularly on the Eastern Seaboard. While practically no media advertising was done, contacts with food editors did bring about a variety of articles in newspapers accompanied by photographs in color of papaya and recipes using papaya. Such contacts also stimulated discussions and demonstrations over radio and television. In addition, a series of in-store demonstrations was undertaken, all of which no doubt contributed to increased knowledge and acceptance of the product.

However, no distinct promotion plan seemed to have evolved. There was, for example, no plan to coordinate the short-term goals of the industry with promotion activities by the industry. There were no long-range plans toward a specific goal over time, into which the total promotion and development program could be fitted. The considerable increase in shipments to the mainland between 1960 and 1965 of about 495 percent (compared with the increase from 1954 to 1959 of about 14 percent) has led many to believe that the industry's promotion activities were largely responsible for this marked improvement. However, a number of other factors entered the picture at that time. In particular, the period 1960 to 1965 saw a reduction in air freight rates to the mainland, a reduction in passenger air fares, and an improvement in the general economic picture which produced a doubling of the number of visitors to Hawaii. In addition, technological advancement, generally favorable weather, and improved prices on the mainland made a doubling of papaya production in Hawaii possible.

To test whether the role of promotion activities by the industry was as important as judged to be by members of the industry, the total quantity of papaya shipments from 1955 to 1965 was related to annual production, promotion expenditures, number of visitors to Hawaii, number of visitors to Hawaii lagged by one year, and per capita national income (see Tables 2.1 and 3.1). The resultant equation was:

$$X_1 = 13803200.0 + \underset{(1.16360)}{0.079X_2} - \underset{(-1.0046)}{41.0574X_3} - \underset{(-1.0378)}{13.3628X_4} + \underset{(1,1932)}{12.7560X_5} + \underset{(1.0630)}{744.80X_6}$$

where: X_1 = Papaya shipments to the mainland
X_2 = Annual papaya production
X_3 = Promotion expenditure
X_4 = Number of visitors to Hawaii
X_5 = Number of visitors lagged by one year
X_6 = The per capita national income

Table 2.1. Papaya mainland shipments and promotion budget, 1955-1965[a]

Year	Mainland shipments	Promotional budget
	1,000 POUNDS	DOLLARS
1955	955	—
1956	1,568	—
1957	2,457	—
1958	2,430	—
1959	2,133	—
1960	1,067	26,800
1961	2,738	20,000
1962	3,320	30,000
1963	3,196	35,000
1964	4,436	40,000
1965	4,939	48,000[b]
1966	5,653[b]	

a Source: State of Hawaii, Department of Planning and Economic Development.
b Estimated.

Table 3.1. Per capita income (U.S.)[a], visitors to Hawaii, 1955-1965[b]

Year	Visitors to Hawaii	Per capita income
	NUMBER	DOLLARS
1955	104,798	1,881
1956	133,815	1,980
1957	168,829	2,050
1958	171,588	2,074
1959	243,216	2,166
1960	296,517	2,217
1961	319,807	2,266
1962	362,145	2,369
1963	429,140	2,456
1964	508,870	2,579
1965	606,010	2,748

aAgricultural Statistics, 1965. U.S. Department of Agriculture, Washington, D.C.
bSource: Visitors to Hawaii. 1965 Research Report, Hawaii Visitors Bureau, 1966, Honolulu, Hawaii.

Figures in parenthesis are T's; $R^2 = 0.9355$. The partial correlation coefficients for the various dependent variables were $r_2 = 0.898$, $r_3 = 0.749$, $r_4 = 0.871$, $r_5 = 0.881$, $r_6 = 0.896$.

Since none of the T's is significant at either the 1-, 5-, or 10-percent levels it may be concluded that a high degree of inter- and auto-correlation exists. However, the partial correlation coefficients ($r_1 \ldots r_6$) seem to indicate that the effects of per capita national income (X_6), which, in turn, strongly influences the number of visitors to Hawaii, and the annual papaya production (X_2) exert a more pronounced influence on papaya shipments to the mainland than promotion expenditures (X_3).

EXPERIMENTAL PROMOTIONAL ACTIVITY

To test the effectiveness of various market developmental activities on the mainland, a number of experiments were carried out during the survey in Sacramento and in Redlands-San Bernardino. Tests with two television programs were conducted in Sacramento and with a radio program in the Redlands-San Bernardino-Riverside area.

In Sacramento a 60-second television color film was produced showing various uses of papaya for salad and main dish preparation. Ten 60-second spots were selected to be run on Wednesdays, Thursdays, and Fridays over a two-week period. Time selection was such that housewives who worked outside the home and those who did not would be exposed to the television messages. The schedule was as follows:

Wednesday	—	11:30 a.m.
Wednesday	—	5:30 p.m.
Thursday	—	12:30 p.m.
Friday	—	12:30 p.m.
Friday	—	5:30 p.m.

The 12:30 p.m. announcements on Thursday and Friday were in conjunction with a women's news program, the 5:30 p.m. announcements on Wednesday and Friday occurred at the end of a movie and the start of a news broadcast, the 11:30 a.m. announcement on Wednesday followed a service program for the homemaker. Financial limitations excluded any prime-time program used either in the evening or in the daytime hours. Two spots cost $58 per minute; four, $94; and four, $116; for a total expenditure of $956.

As stated previously, two such experiments were carried out, one in the spring from March 7 through March 13, 1966, the other in the fall from September 28 through October 7, 1966. The spring experiment was seriously hampered by a shortage of papaya due to crop damage caused by sudden storms and otherwise unfavorable weather conditions. As Chart 2 shows, the March experiment had no influence on the sales of papaya in Sacramento. Even a one-page newspaper article with color photographs and a series of papaya recipes appearing in The Sacramento Bee during the second week of the experiment did not improve papaya sales. Messages received from participating retailers pointed out the supply shortage and the high cost of papaya on the San Francisco market at that time.

The repetition of this experiment in the fall (weeks 51 and 52 in Chart 2), also did not bring forth especially favorable results. Although there was no supply shortage during that time, demand dropped off at all price levels except at the 39-cent level. The increase in demand at 39-cent prices was due largely to a special newspaper advertisement and a promotion campaign carried out by one of the participating stores during that time. Had the television experiment had any noticeable effect on the demand for papaya there should have been far more pronounced evidence of upward adjustment on other price levels than did in fact take place. The slight increase in demand on the 49-cent level, as shown in Chart 2, could just as well have occurred due to the general impact on all sales made by the campaign of one store.

In general it was found that newspaper advertisements featuring sales of papaya in individual stores have more effect than any other form of advertising. Newspaper advertising was carried out solely for papayas sold at the 39-cent and the 49-cent level. In response to such advertising, in almost all cases, a peak of sales was reached which very rapidly collapsed, frequently, in fact, below the "take-off" point, as shown in Chart 2. The series of evaluations in the Sacramento area indicate that small sales advertisements appearing in Thursday's or Friday's newspapers affected sales more readily than all other methods of promotion that were carried out. The rapid drop in sales peaks following newspaper advertising may in part be due to supply shortages (failure on the part of the retailer to follow up) and in part due to the fact that many consumers still purchase papaya because of curiosity without intending regular, continued consumption of the product. Any papaya market development effort will need to engage in improved promotion follow-up and increased consumer education.

Experiments in the Redlands-San Bernardino-Riverside area were conducted mainly with a radio program broadcast by a San Bernardino radio station. There were 72 30-second announcements made over a two-week period. An average of 8 announcements were made each day, 5 on Tuesday, 8 on Wednesday, 9 on Thursday, 9 on Friday, and 5 on Saturday. In addition, listeners were invited to participate in a station contest in which winners were invited to pick up two papayas from the station. Copies of letters to the 14 contest winners and copies of the station announcement are included in Appendix B.

Chart 3, part II, which shows papaya sales at various price ranges from February to April 1967, indicates that the radio program in the Redlands-San Bernardino area did not markedly contribute to papaya sales increases. The high peak preceding the radio program occurred in response to a sales campaign conducted by one store. The secondary peak, which did occur during the period of the radio program, cannot be considered a result of this program for the simple reason that it conforms quite closely to previous advertising experience of the demand for papaya. This is substantiated by comparing weeks 39, 40, and 41, following the high peak of week 37, with the follow-up peak shown in weeks 83 and 84 in part II of Chart 3.

Unfortunately not sufficient time had elapsed to follow through on the possible long-range effect of the radio program. It may however be assumed

that the effects of this program were rather negligible.

The media experiments carried out in our survey were rather unsuccessful. Neither the television programs nor the radio programs showed any marked effect on the demand for papaya. It could, of course, be argued that these programs occurred over a period of time too short to yield meaningful results. Also, it may be said that the programs were of an inferior quality. Yet, they were designed by advertising agencies of excellent repute. While a longer time span for each media experiment might have provided more determinate results, the fact that there was no noticeable response to these experiments indicates that media exposure (except through newspaper advertising) is not, at the present time at least, an effective and efficient method of market development for papaya.

As the public in general gains more product knowledge, as, in other words, papayas become more integrated into the consumption patterns of individuals, radio and television advertisements will become increasingly meaningful promotional tools. In the meantime, advertising activities in individual retail outlets (newspaper advertisements, in-store sales campaigns, etc.) seem the more successful methods.

PART II: POPULAR ATTITUDES TOWARD CONSUMPTION OF GAMMA-IRRADIATED FOODS[5]

INTRODUCTION

Because of a number of Food and Drug Administration requirements, irradiated papaya was not available to be placed on the market. So demand characteristics could not be tested and market development plans evolved. A somewhat roundabout method was therefore devised in order to obtain at least an inkling of what could be expected. The means used was to select a population sample and to ask individuals in the sample whether irradiation would or would not create a consumption barrier and to what extent it would do so. Reference was made here to irradiated **food** rather than irradiated **papaya.** The obvious aim was to eliminate as far as possible any bias connected with the consumption of papaya per se.

The basic plan was as follows: A representative sample of the population in two test cities was to be polled on (1) its attitude toward food irradiation, (2) its knowledge of food irradiation, and (3) wherever applicable, reasons for negative attitudes toward food irradiation. This information was to be related to certain societal and demographic factors, such as income, age, education, sex, etc., to determine the extent to which these factors influence attitudes towards food irradiation. The results of this survey were then to form the basis for the educational and promotion activities required to elicit a more informed response toward food irradiation itself. Knowledge of the factors involved can point toward expected demand responses to irradiated papaya. Thus if it is found, for example, that the predominant number of those who consume papayas are in the $10,000 to $15,000 annual income bracket and if it is known that, say, 60 percent of those in this income bracket would refuse consumption of any irradiated foods, it could then be concluded that the demand for irradiated papaya would be reduced by about 60 percent. On a more general plane, findings of this nature would give insight into the direction in which educational and promotion activities would need to move.

There was another reason for conducting this part of the survey. It is quite evident that once food irradiation becomes widely employed for food preservation and shelf-life prolongation, the various irradiated products will need to be labelled as such. Since the wording and formulation of these labels may directly affect the demand for irradiated foods, a set of labels was introduced into this survey so that the degree of its acceptability or non-acceptability to respondents may be tested.

[5]This section was prepared with the invaluable assistance and advice of Dr. James Allen, sociologist in the Department of Home Economics, University of Hawaii.

METHODOLOGY

Limitation of funds and time required that this attitudinal survey be conducted by telephone rather than by personal interviews. A schedule was therefore designed to elicit the required information in a telephone survey. Prior to release of the schedule to enumerators in Sacramento and Redlands, California, it was tested in conferences with two panels of housewives in Kailua, Hawaii. Panel 1 consisted of nine members and Panel 2, four. The purposes of this pre-test were (1) to determine whether the structure of the schedule would meet the required criteria in terms of time and effectiveness, (2) to discuss various approaches to prospective respondents (e.g., best time of day to make a call, introductory remarks by the interviewer, etc.), and (3) to obtain a first indication of general attitudes toward the concept of food irradiation. Moreover, a number of labels for irradiated foods were devised and submitted to the panels for later introduction into the main questionnaire.

While the two panels were equal in terms of ethnic and religious distribution, there were differences in terms of per family income, education, and occupational environment. Panel 1 consisted of a large proportion of college graduates. Their per family incomes averaged between $10,000 and $15,000 per year and their own, as well as their husbands' occupations, were mainly in professional and managerial categories. Panel 2 consisted of somewhat younger women, none of whom had attended college. Their average per family income was less than $5,000 per year and their husbands were either in the military service or associated with the military in a civilian capacity.

The two panels met at different times and care was taken that members of one panel did not know members of the other. At the beginning of each session, panel members were asked to complete a brief general information sheet about themselves and their family to establish some of the demographic and family background. They were then introduced to the purposes of the tests and finally the set of questions was posed to them. The first question was on the members' preparedness to consume or purchase gamma-irradiated foods provided the Food and Drug Administration and the U.S. Department of Agriculture were to approve of this process. While all members of Panel 2 said they would purchase irradiated foods and consume them, only three members of Panel 1 indicated that they would do so. The remainder said that they would refuse on the grounds that (1) they did not know exactly what irradiation of food meant and (2) that they were concerned over possible health hazards that might derive from this process. None of the members of Panel 2 knew what gamma irradiation of food meant but were prepared to purchase and consume irradiated foods. Here, Food and Drug Administration and USDA approval evidently appeared to be sufficient guarantee to alleviate any question of health or other hazards generally associated with irradiation.

The next step was to present the panels with the set of labels designed to be used for identification of irradiated foods. Three labels, "Radiation Processed," "Radiation Sterilized," and "Radiation Pasteurized," were submitted to these panels for evaluation on a hedonic scale ranging from 1 through 5 (1 being unfavorable, 5 being favorable). In addition, panel members were invited to suggest alternative labels that they would consider acceptable to

their taste. Members of Panel 1 suggested the inclusion of the label "Radiation Preserved" as an acceptable alternative to those already presented. The response by the panels is shown in Table 1.2. Note that none of the labels is, in fact, "liked" by the majority of respondents. Dislike and non-acceptability of all labels seemed to predominate among members of Panel 1, and only "Radiation Processed" was acceptable to some. Panel 2, however, showed considerable indifference to all labels.

Table 1.2. Panel response to three labelling alternatives

	Panel 1					Panel 2					
	Rating[a]:	1	2	3	4	5	Rating[a]:	1	2	3	4	5
		NO. OF PERSONS RESPONDING						NO. OF PERSONS RESPONDING				
"Radiation Pasteurized"		2	1	6	0	0		0	0	4	0	0
"Radiation Sterilized"		2	4	3	0	0		0	0	3	0	1
"Radiation Processed"		2	2	3	1	1		0	1	3	0	0

[a]1 = unfavorable; 3 = indifferent; 5 = very favorable.

Various approach statements to be made by interviewers in the two test cities as well as the best time during which calls should be made were discussed with both panels. Generally, there was considerable apprehension about the telephone method of survey and personal interviews were preferred by a majority of panel members. The use of mailed questionnaires was considered but was later rejected on the grounds that normally only a small percentage of such questionnaires were completed and returned to the investigators.

From these discussions and deliberations, the two-part schedule was developed. The first part contained the interviewer's introduction and a short explanation of the purposes of the survey followed by three questions on (1) preparedness to purchase and consume irradiated foods, (2) knowledge of the concept of irradiation, and (3) reasons for non-acceptance of irradiated foods. The first part also included the presentation of the four labels discussed above plus "Processed by Ionizing Radiation." The second part contained questions dealing with general information, including age, marital status, education, occupations of the interviewee and spouse, income, race, religious preference.

In the performance of the surveys in the two test cities, the following provisions were made: First, 1,000 responses were to be obtained in each of the test cities. Secondly, interviewees were to be randomly selected from the telephone book by selecting the third name in columns 1 and 3 of each page in the local telephone book. In the event that no answer was obtained, the interviewer was instructed to call the next name in that column. If the party called answered but refused to participate, the reason for the refusal was noted, and the next name was selected in the previously described random fashion. Thirdly, upon completion of an interview, the name and address of the respondent were recorded on the schedule.

In Sacramento, 1,552 individuals were contacted, of which 402 refused to participate because they felt they had insufficient knowledge of the subject to talk about it, 38 had language problems, and 8 did not wish to answer any telephone survey on principle. Of the 1,004 responses received, 7 had to be discarded because of errors in completion so that a total of 997 responses remained for analytical purposes. In Redlands, 1,005 individuals were contacted, of which 163 refused to answer on the grounds that they felt that they did not know enough about the subject to discuss any part of it, 11 had language problems, and 1 refused to answer any survey on principle. Of the 825 responses received, 18 had to be discarded due to sampling errors, and 807 completed responses were available for analysis. A total of 1,804 responses from both test cities became available for analytical purposes.

In order to establish the representativeness of the sample an attempt was made to compare the population profiles of the two test cities with the profiles obtained from the sample. To make this comparison, data that appeared

Table 2.2. Comparison of partial sample profile with partial metropolitan population profile, Sacramento, 1966

	Sacramento	
	Sample	Metropolitan[a]
	PERCENT	PERCENT
Per family income		
Less than $5,000	15.5	23.0
$5,000 to less than $10,000	47.1	50.0
$10,000 to less than $15,000	30.0	20.0
$15,000 and over	7.4	7.0
Age distribution (women)		
Less than 25 years	8.2	11.0
25 to 34	29.9	26.0
35 to 50	36.8	36.0
51 to 64	18.1	15.0
65 and over	7.0	12.0
Race of population		
White	92.7	96.0
Negro	4.6	2.0
Oriental	2.2	2.0
Other	0.5	0.0
Education		
Less than high school	10.0	31.0
High school graduate	44.3	31.0
Second year college	20.5	19.0
College graduate	20.0	19.0
Other	5.2	0.0

[a]Source: McClatchy Newspapers, Sacramento, California (1966).

in a publication, "The Sacramento 19 County Market and Metropolitan Area," prepared by the Research Department of the McClatchy Newspapers for The Sacramento Bee, were used. Data compared pertain to income, age, and racial distribution in metropolitan Sacramento. Table 2.2 shows that in these three aspects, the city's population profile fits well the random sample taken in Sacramento. Other statistical representations in the publication were not comparable to the various categories in our sample, so they were not compared. It was however felt that those statistics that were compared are ample evidence that the sample taken is fairly representative of the total population profile of Sacramento. It was therefore concluded that findings on behavior gained from the telephone survey would not significantly differ from the actual population behavior in Sacramento. Unfortunately, no similar comparison was possible in the Redlands area since there was available no recent publication of a population profile for that area.

FINDINGS

In this section the first part of the schedule will be examined, question by question, and the results obtained for Sacramento, Redlands, and the total sample (both areas combined) will be analyzed.

Question 1 stated: "Would you purchase or consume food that has been treated by X-ray irradiation provided that the U.S. Food and Drug Administration (FDA) and the U.S. Department of Agriculture (USDA) approved of this method?" Three-fourths of all those who answered this question appeared prepared to consume irradiated foods. A little over 21 percent answered in the negative while nearly 4 percent appeared indifferent. It may be worthy of note that the attitudinal differences between respondents of Redlands and of Sacramento are not large, less than 4 percent of the positive, 2 percent of the negative responses (Table 3.2).

Question 2 concerned itself with the respondents' knowledge of irradiation and it was posed as: "Do you know what X-ray irradiation of food means?" As shown in Table 4.2, two-thirds of all respondents did not know the meaning of food irradiation. Yet 75 percent of all respondents indicated that they would consume irradiated foods. One can only conclude that the phrase "provided that the U.S. Food and Drug Administration and the U.S. Department of Agriculture approved of this method" directly affected the response to the first question. More specifically, it may be concluded that there is sufficient popular trust in these two agencies that their approval itself makes a given food treatment acceptable, even to those who do not understand the food treatment involved. While it would have been interesting to find out what the response to question 1 would have been had the phrase been deleted, concern with the size of the schedule and awareness that deletion would have led to an academic debate prompted its maintenance in question 1.

Question 3 was directed solely to respondents who gave a negative answer to question 1. It was stated as follows: "You have indicated that you would not consume irradiated foods. Would you state some of the reasons for your stand?" The responses were then categorized as follows (see Table 5.2):

(1) Dangerous to health, (2) religious reasons, and (3) negative connotations, which consisted of (a) bomb, (b) nuclear fallout, (c) cancer, (d) burns, (e) other, and (f) no answer.

Over three-fourths of the respondents failed to answer this question. The most important concern expressed by respondents was with the "health hazard" of food irradiation. Of the 3.7 percent categorized as "other" the greater majority (86 percent) were largely concerned with inexperience in the state of the art. Sample comments were: "We (meaning mankind in general) don't know enough about irradiation," or, "Until we know more about it, we shouldn't fool around with irradiation." The remaining 14 percent were concerned with possible genetic repercussions ascribed to irradiation in general.

The next set of questions was concerned with labelling of irradiated foods. At this point the enumerator explained what was meant by irradiation and presented the five labels to the respondent who then was asked to state on each whether he liked or disliked the label or found it acceptable or non-acceptable. The explanatory statement given to the interviewee was as follows: "We understand irradiation of food to mean the following: exposing food to X-ray or gamma rays for a short period of time for the purpose of disinfestation and shelf-life extension of food without injuring or changing taste, texture, aroma, or color of the product." It can be seen in Table 6.2 that the label "Radiation Processed" was the most liked. The most disliked label was "Processed by Ionizing" and the most non-acceptable was "Radiation Preserved." It would be very difficult to explain the last result.

Table 3.2. Response to question 1: Would you purchase or consume food that has been treated by X-ray irradiation provided that the U. S. Food and Drug Administration and the U. S. Department of Agriculture approved of this method?

Response	Redlands	Sacramento	Total Sample
	PERCENT	PERCENT	PERCENT
Yes	72.6	76.9	75.0
No	22.4	20.4	21.3
Indifferent	5.0	2.7	3.7

Table 4.2 Response to question 2: Do you know what X-ray irradiation of food means?

Response	Redlands	Sacramento	Total Sample
	PERCENT	PERCENT	PERCENT
Yes	26.0	30.7	28.6
No	64.6	68.9	67.0
No answer	9.4	0.4	4.4

Table 5.2 Response to question 3: You have indicated that you would not consume irradiated foods. Would you state some of the reasons for your stand?

Response	Redlands	Sacramento	Total Sample
	PERCENT	PERCENT	PERCENT
Dangerous to health	16.6	15.5	16.0
Religious reasons	0.1	—	0.1
Negative connotation:			
Bomb	0.1	—	0.1
Nuclear fallout	0.4	0.1	0.2
Cancer	1.7	1.3	1.5
Burns	—	0.1	0.1
Other	4.0	3.9	3.7
No answer	77.1	79.1	78.3

Although there are definite quantitative differences between the results from Redlands and from Sacramento, the two samples are in agreement on the labels that are the most liked and the most disliked. There is, however, some variation in the non-acceptability of labels, which cannot be explained on the basis of information presently available.

To establish the significance or non-significance of population characteristics having an influence on the willingness to consume or not to consume irradiated foods, a program was written for the IBM 360, which gave percentage breakdowns of various population charateristics (e.g., income, education, occupation) of those respondents who said they would or would not consume irradiated foods. Table 7.2 shows that of all those respondents who would consume irradiated foods, 30 percent knew the meaning of the term "irradiation," while 69 percent did not. Of those who would not consume irradiated food 33 percent knew and 66 percent did not know the meaning of this term.

Conversely of those who knew the meaning of "food irradiation" 79 percent would consume irradiated foods, 17 percent would not, and 4 percent would be indifferent. Among those who did not know the meaning of "irradiated foods" 77.4 percent would consume irradiated foods, 19 percent would not, and 3 percent would be indifferent. Since the difference in response to this question was not significant between these two groups, it can be concluded that knowledge of the term "irradiated" has no significant effect on an individual's preparedness to consume or not to consume irradiated foods.

Looking at the **age** distribution of both groups (Table 7.2) it can again be demonstrated that there are no significant differences between the two groups (those who would and those who would not consume irradiated foods) and the percentage breakdown in both groups conforms closely to the age distribution of the total sample. It can therefore be concluded that the age of individuals does not significantly affect the preparedness to consume irradiated foods.

A chi-square test on this statistic proved non-significant, substantiating the evidence presented in the "age" section of Table 7.2. In fact, all other variables of the population profile of the whole sample related similarly to questions of consumption of irradiated foods. Chi-square tests were performed on the relationship of education, income, race, religious preference, and sex to preparedness to consume or not to consume irradiated foods. All tests showed that any deviation due to these variables is non-significant and therefore has apparently no impact on the acceptability or non-acceptability of irradiated foods. The only exception was sex. Had all 1,804 respondents been males, results would have shown that 82 percent would consume irradiated foods while 15 percent would not, with 3 percent indifferent. Conversely had all respondents been females, 73 percent would have answered in the affirmative, 22 percent in the negative, and the remaining 5 percent would have been indifferent.

Similar statistics appeared also in those occupations which were predominantly held by males or those predominantly held by females. Thus, had all respondents been members of the Armed Forces, 82 percent would have answered positively, 16 percent negatively, 2 percent would have been indifferent. Conversely, had all respondents been housewives or secretaries, computation shows that 74 percent would have given a positive answer, 24 percent a negative answer, while the remaining 2 percent would have been indifferent.

One additional category differs significantly from the sample distribution of acceptance and non-acceptance of irradiated foods, the category of those respondents who had attended only the first six grades of school. Had the sample been composed only of this group, only 55 percent would have given a positive answer, 30 percent would have responded negatively, while the remaining 15 percent would have been indifferent.

Table 6.2. Preference ratings of terms to be used on labels for irradiated foods

	Like			Dislike			Acceptable			Not acceptable		
	R[a]	S[b]	T[c]	R[a]	S[b]	T[c]	R[a]	S[b]	T[c]	R[a]	S[b]	T[c]
	PERCENT			PERCENT			PERCENT			PERCENT		
"Radiation pasteurization"	13.5	16.4	15.1	9.5	12.0	10.9	58.2	53.8	55.9	15.0	17.7	16.6
"Radiation sterilized"	19.3	25.7	22.8	11.3	16.9	14.4	48.8	29.4	38.1	16.7	28.0	22.9
"Radiation processed"	25.9	32.5	29.5	2.9	5.8	4.5	54.4	50.1	52.0	13.1	11.5	12.3
"Radiation preserved"	20.4	12.1	15.9	4.6	11.4	8.4	58.4	43.2	50.0	13.1	33.1	24.2
"Processed by ionizing"	10.9	13.7	12.9	24.4	52.8	40.1	41.6	18.2	28.7	19.2	15.2	17.3

[a]R = Redlands.
[b]S = Sacramento.
[c]T = Total sample (Redlands and Sacramento).

Table 7.2 Positive and negative attitude toward acceptance of irradiated foods, related to various demographic characteristics

Those who would consume irradiated foods	Variables	Those who would not consume irradiated foods	Total sample
PERCENT		PERCENT	PERCENT
30.0	Knew the meaning of irradiation	23.4	28.6
69.1	Did not know the meaning of irradiation	60.4	67.0
0.9	Did not answer question	16.2	4.4
	Age		
10.6	Less than 25	7.8	9.9
27.1	25 to 35	26.6	27.7
23.6	36 to 45	25.3	23.8
15.2	46 to 55	19.5	15.9
11.1	56 to 65	9.6	10.6
11.9	Over 65	10.4	12.1
	Marital Status		
81.1	Married	82.6	81.3
5.6	Single	6.0	5.5
2.7	Divorced	1.8	2.5
0.4	Separated	0.8	0.4
7.7	Widowed	5.7	7.3
3.6	No answer	3.1	2.9
	Education		
0.6	Grade 1 to 6	1.0	0.7
9.0	Grade 7 to 9	9.6	9.3
43.7	Grade 10 to 12 (high school graduates)	46.7	44.3
21.3	College 1 to 2	18.8	20.5
21.1	College 3 to 4 (college graduates)	20.1	20.9
2.4	M.A. or M.S. degree	1.8	2.2
0.4	Ph.D.	0.0	0.4
1.3	No answer	1.8	1.6

Table 7.2 (continued)

Those who would consume irradiated foods		Variables	Those who would not consume irradiated foods		Total sample	
PERCENT			PERCENT		PERCENT	
Husband	*Wife*	*Occupation*	*Husband*	*Wife*	*Husband*	*Wife*
—	66.7	Housewives	—	65.1	—	66.2
8.6	—	Engineers, technical	6.2	—	7.8	0.1
1.3	2.5	Medical, other health	3.1	2.6	1.8	2.7
5.5	5.4	Teachers—grade, high school	4.4	5.7	5.2	5.5
10.3	1.8	Other professors (accountants, colleges)	9.6	1.3	8.9	1.6
1.0	—	Farmers and farm managers	1.3	—	1.1	—
10.2	1.1	Managers, proprietors, officials	7.6	1.6	8.8	1.2
0.1	3.6	Secretaries, typists	—	2.9	0.1	3.3
4.7	5.8	Clerical	4.9	6.5	3.3	5.0
6.7	1.6	Sales workers	7.0	2.4	6.8	1.8
5.5	—	Construction	5.5	—	5.5	—
3.5	—	Mechanics repair	4.2	—	3.3	—
1.3	—	Metal workers	1.8	—	1.4	—
1.8	0.4	Other craftsmen	2.1	—	1.8	0.3
2.4	0.1	Drivers, delivery men	2.1	—	2.2	0.1
2.4	1.0	Other operatives	2.6	0.5	2.3	0.9
—	0.3	Private household	—	0.8	—	0.4
1.9	0.1	Protect services	1.6	0.3	1.4	0.1
0.1	0.6	Waiters and cooks	0.3	0.3	0.2	0.5
2.6	1.3	Other service workers	1.6	2.1	1.9	1.3
—	—	Unpaid farm lab	—	—	—	—
—	—	Paid farm lab	—	—	—	—
0.9	0.1	Laborer	3.4	0.3	1.3	0.2

Table 7.2 (continued)

Those who would consume irradiated foods		Variables	Those who would not consume irradiated foods		Total sample	
PERCENT			PERCENT		PERCENT	
Husband	*Wife*	*Occupation (Cont'd)*	*Husband*	*Wife*	*Husband*	*Wife*
3.8	—	Military	2.9	—	0.2	—
3.2	1.1	Others	5.5	1.8	3.3	1.1
19.6	6.4	Retired	20.1	5.2	20.1	6.1
		Income				
19.3		Less than $5,000	20.6		19.8	
43.2		$5,000 but less than $10,000	43.5		43.1	
26.7		$10,000 but less than $15,000	24.7		26.1	
8.8		$15,000 and over	7.6		8.4	
2.1		No answer	3.6		2.6	
		Race				
94.1		White	93.8		94.0	
2.7		Negro	3.4		2.8	
1.6		Oriental	0.3		1.3	
0.9		Other	1.0		0.9	
0.8		No answer	1.6		1.0	
		Religion				
69.9		All Christian, not Catholic	68.0		69.3	
19.7		Catholic	22.4		21.8	
0.6		Jews	0.5		0.6	
1.5		Other	1.0		2.8	
8.3		No answer	8.1		8.5	
		Sex				
78.6		Women	86.2		80.4	
21.4		Men	13.8		19.6	

SUMMARY AND CONCLUSION

Of 1,804 respondents, over three-fourths were prepared to purchase and consume irradiated foods while 21 percent were not, the remainder being indifferent.

Findings demonstrate that the population profile of the sample of 997 individuals in Sacramento conforms very closely to the population profile of the city as a whole. It could therefore be inferred that the behavior characteristics demonstrated in the sample can be ascribed to the total population of Sacramento. Although no such comparison was feasible for Redlands findings, the relative similarity of the responses of the samples of the two cities leads to the assumption that behavior characteristics of the Redlands sample are representative of the cities' population. In short, the behavior patterns established in the city of Sacramento may not be very divergent from those of the city of Redlands.

No perceptible demographic, educational, economic, and other differences could be determined between those individuals who would refuse consumption of gamma-irradiated foods and those who would be willing to consume them. These results do not depend on the degree of knowledge of the individuals regarding the concept of food irradiation.

Of those who would refuse consumption of irradiated foods, 15 percent did so because of a direct concern with assumed health and genetic hazards associated with the idea of irradiation. The remainder would refuse to consume irradiated foods either because they themselves feel that they do not know enough about the process or that the present state of the art is insufficiently developed to make irradiated foods an acceptable product.

It would seem, therefore, that in order to alleviate some of these doubts any educational activity either by government or by some private organizations should concentrate particularly on explaining precisely the state of the art in food irradiation and then attempt to demonstrate publicly the general safety of this method of food preservation. However, as can be seen from our investigation, the number of individuals expressing doubts and fears of health hazards in food irradiation is relatively small, comprising only about 3 to 4 percent of the total sample (approximately 15 percent of all those who gave a negative response to question 1). On the other hand, about 12 to 14 percent of the total sample would demand more knowledge about this subject from the scientific community. This indicates that most respondents expressing such concerns are not aware of the range of knowledge that has, in fact, been accumulated in this field.

If legal requirements were to make it necessary to label gamma-irradiated foods, our findings show that the label "Radiation Processed" was most liked and would bring about a minimum of apprehension and fear on the part of consumers. It was not within the scope of this study to determine why any one label should be so universally preferred over others. Of course, additional research and the development of other labelling alternatives should be carried out.

PART III. SUMMARY AND RECOMMENDATION

This study of the market behavior of papaya reveals that the product is much less price sensitive than it is supply and display sensitive. Changes in product price have much less effect on papaya disappearance rate than available supplies, condition of the product, shelf position in the store, etc. In short, market behavior of papaya is similar to that of other new products, which are primarily impulse items. No effective price awareness exists as yet in the minds of consumers, in either Sacramento or Redlands, with respect to papaya. However, the price spread in the Redlands area was much narrower than in Sacramento and there was some indication of a turn toward a single-price system (39 cents) evolving in the Redlands area.

Since available supply and large displays are important factors affecting the demand for papaya, considerable attention should be given to these at the retail level. A significant competitive relationship between white grapefruit and papaya was found in both test areas, and between banana and papaya in the Sacramento area. Retailers would therefore be well advised to display the papaya in the vicinity of these competing fruits. Other competing items included in the survey evidently have no effect on the demand and the rate of disappearance of papaya.

Market development experiments consisting primarily of television and radio programs were made in both test cities. In addition, the effect that newspaper articles and weekly newspaper advertising had on the disappearance rate of the product was observed and analyzed. Of all the various systems of promotion employed, weekly newspaper advertisements had by far the most pronounced impact. Neither the two television campaigns in Sacramento nor the radio campaign in the Redlands-San Bernardino-Riverside area affected papaya disappearance in any discernible way. Both graphic and arithmetic analysis reveal this. It should, however, be made clear that present attempts to measure statistical significance of the effects of advertising and promotion on the demand for any product have proved to be largely unsuccessful. In the case of papaya, small newspaper advertisements made in conjunction with omnibus advertisements, as is frequently done by food retailers, seem to have the most pronounced effect on product disappearance. It is to be noted, however, hat sales peaks created by this form of advertisement are only of short duration and frequently collapse rapidly, within one week's time. Sales levels during the following week or weeks may fall below those levels existing prior to the insertion of the advertisements in the newspapers. In fact, this was found to be the usual pattern, particularly in the Sacramento area.

Given, then, the various factors regarding the demand characteristics and the form of advertising sensitivity of papayas the following recommendations may be made with respect to market development of the product:

(1) All market developmental work that might be undertaken by the industry should primarily be retailer directed.
(2) Media advertising (television and radio and large newspaper or journal advertisements) should be used sparingly and only occasionally.
(3) Market development should first concentrate on one specific region

(e.g., California). Experience and proven methodology derived from this regional development may be used for future extension to other regions or states.

In particular, the papaya industry would be well advised to make concerted use of special representatives (missionary salesmen) in the market areas to be developed. These representatives would regard, as their primary function, giving advice to retailers on the best methods of storing, handling, and displaying papayas. Since available supplies of this product have such an important effect on its sales, steps toward effective inventory controls should be taken. Since papayas are an impulse item they need to be displayed in large quantities. At the same time, however, spoilage also must be kept down to the lowest possible point. A system which would develop the most workable balance between continued supply flow and spoilage reduction will be of considerable benefit to both the industry and the individual retailer.

Since short and relatively inexpensive newspaper coverage (omnibus advertisements) has proved successful in affecting the disappearance rate of papaya, this method should be continued and expanded. It may be suggested here that the industry actively participate with retailers on the mainland in such advertising activities. This, again, can best be achieved through special representatives. At the same time, of course, continued education of the consumer in the use and value of papayas should be carried out. This can best be done through leaflets in color or recipe booklets made available to consumers at the retail outlet. As market development evolves, as papaya becomes less of an impulse and a curiosity item than it is now, as it becomes increasingly an integral part of the family food consumption pattern, advertising through television and radio as well as magazines may have increasing effect on the demand for papayas. In any event, strict **quality control** by the industry from tree to consumer's table will have to form the basis of all market development activity.

It is entirely possible that in the near future, when food irradiation is expected to be a commonly employed method of food preservation and shelf-life prolongation, the problem of maintaining ample supplies of papaya will be considerably reduced.

The process of irradiation will have no serious, adverse effects on the long-run demand for papayas. Since the various sociological and demographic factors are evenly distributed among individuals who would accept and those who would not accept irradiated foods there would be, according to our findings, a reduction of 23 percent in the short-run demand for papayas if irradiation were to be introduced **at this moment** and if all other factors were to remain ***ceteris paribus.*** Since a large proportion of those who would refuse consumption of irradiated foods do so solely on a basis of lack of sufficient information and since the number of "hard core" opponents to the process appears to be negligible, the negative short-run effects on the demand for papaya may also be quite negligible. Moreover, these effects will be offset by the benefits derived from irradiation in shelf-life prolongation and the reduction in spoilage rates. Since supply and display are critical factors in the demand for papaya, the effects of irradiation processing will be to markedly increase this demand through improved supply-maintenance capabilities of the retailers.

APPENDIX A
DEMAND FOR PAPAYA AT RETAIL LEVEL
(Sacramento and Redlands Area)

Equation 1A. Demand for Papaya, Sacramento

$$
\begin{aligned}
X_1 = 0.473 &- \underset{(-4.259)*}{0.119X_2} + \underset{(1.140)}{0.475X_3} + \underset{(15.620)*}{0.323X_4} + \underset{(0.847)}{0.0226X_5} \\
&+ \underset{(3.016)*}{0.287X_6} + \underset{(1.322)}{0.268X_7} + \underset{(2.803)*}{0.125X_8} + \underset{(0.642)}{0.0273X_9} + \underset{(0.0989)}{0.00696X_{10}} \\
&+ \underset{(0.8223)}{0.0570X_{11}} + \underset{(0.367)}{0.062X_{12}} + \underset{(8.535)*}{12.212X_{13}} - \underset{(-0.626)}{0.364X_{14}} + \underset{(2.851)*}{2.200X_{15}} \\
&+ \underset{(2.625)*}{4.060X_{16}} + \underset{(0.385)}{0.0058X_{17}} - \underset{(-0.354)}{0.00542X_{26}} - \underset{(-0.255)}{0.0000858X_{27}} + \underset{(0.333)}{0.000518X_{28}} \\
&- \underset{(-1.0974)}{0.0743X_{29}} + \underset{(2.323)*}{0.0544X_{30}} - \underset{(-0.376)}{0.00150X_{31}} - \underset{(-0.611)}{0.00447X_{32}} - \underset{(-0.346)}{0.0070X_{33}}
\end{aligned}
$$

X_1 = Quantity of papaya sold (Sacramento—Retail level)		
X_2 = Price of papaya	r_2 =	0.352
X_3 = Wholesale at San Francisco	r_3 =	0.399
X_4 = Papaya supply	r_4 =	0.699
X_5 = Price of cantaloupe	r_5 =	0.356
X_6 = Price of banana	r_6 =	0.472
X_7 = Price of fresh pineapple	r_7 =	0.386
X_8 = Price of grapefruit (white)	r_8 =	0.443
X_9 = Price of grapefruit (pink)	r_9 =	0.314
X_{10} = Price of grapefruit (cello bags)	r_{10} =	0.175
X_{11} = Price of orange	r_{11} =	0.464
X_{12} = Price of orange (cello bags)	r_{12} =	0.0674
X_{13} = Special advertisement	r_{13} =	0.462
X_{14} = Condition of papaya	r_{14} =	0.324
X_{15} = Display	r_{15} =	0.467
X_{16} = Television	r_{16} =	0.189
X_{17} = Week	r_{17} =	0.300
X_{26} = Quantity of cantaloupe	r_{26} =	0.0640
X_{27} = Quantity of banana	r_{27} =	−0.121
X_{28} = Quantity of fresh pineapple	r_{28} =	−0.0208
X_{29} = Quantity of grapefruit (white)	r_{29} =	−0.0385
X_{30} = Quantity of grapefruit (pink)	r_{30} =	−0.0181
X_{31} = Quantity of grapefruit (cello bags)	r_{31} =	−0.0297
X_{32} = Quantity of orange	r_{32} =	−0.150
X_{33} = Quantity of orange (cello bags)	r_{33} =	−0.0138

$R^2 = 0.621183$ $\quad D.F. = 675$ $\quad F = 46.1193*$

Figures in parenthesis = T

*Significant at the 1-percent level.

Equation 2A. Demand for Papaya, Redlands area

$$X_1 = 0.783 - 0.470X_2 + 3.354X_3 + 0.833X_4 - 0.0477X_5$$
$$(-2.320)^* \quad (1.170) \quad (33.659) \quad (-0.655)$$

$$+ 0.0617X_6 + 0.351X_7 + 0.317X_8 + 0.184X_9 + 0.813X_{10} + 0.0438X_{11} - 0.244X_{12}$$
$$(0.177) \quad (1.060) \quad (2.008)^* \quad (1.0301) \quad (2.432)^* \quad (0.151) \quad (-1.070)$$

$$- 45.851X_{13} - 5.070X_{14} + 3.271X_{15} - 0.106X_{17} + 0.00790X_{26}$$
$$(-7.019)^* \quad (-2.067)^* \quad (1.998) \quad (-1.043) \quad (0.170)$$

$$- 0.0113X_{27} + 0.0973X_{28} - 0.0720X_{29} + 0.0643X_{30} - 0.160X_{31}$$
$$(-0.390) \quad (5.412)^* \quad (-0.392) \quad (0.799) \quad (-1.641)$$

$$- 0.0381X_{32} + 0.416X_{33}$$
$$(-0.708) \quad (0.233)$$

For identification of variables see equation 1A.

(X_1 = Quantity of papaya sold, Redlands-San Bernadino-Riverside retail level)

(X_3 = Wholesale price at Los Angeles)

r_2 =	0.373		
r_3 =	0.421	r_{15} =	0.416
r_4 =	0.826	r_{17} =	0.734
r_5 =	0.346	r_{26} =	0.221
r_6 =	0.406	r_{27} =	0.229
r_7 =	0.416	r_{28} =	0.532
r_{10} =	0.434	r_{29} =	0.324
r_{11} =	0.429	r_{30} =	0.370
r_{12} =	0.103	r_{31} =	0.096
r_{13} =	0.343	r_{32} =	0.202
r_{14} =	0.303	r_{33} =	−0.095

$R^2 = 0.716$ $D.F. = 1264$ $F = 138.291$ (significant at 1-percent level)

Figures in parenthesis = T

*Significant at the 1-percent level

Equation 3A. Demand for Papaya, Sacramento and Redlands area

$$X_1 = 0.106 - \underset{(2.421)*}{0.2094X_2} + \underset{(0.773)}{1.003X_3} + \underset{(46.533)*}{0.8224X_4} + \underset{(0.610)}{0.0310X_5}$$
$$+ \underset{(1.088)}{0.232X_6} - \underset{(-0.293)}{0.0168X_7} + \underset{(2.635)*}{0.502X_8} + \underset{(0.522)}{0.0875X_{11}} + \underset{(6.356)*}{23.863X_{13}}$$
$$- \underset{(-2.470)*}{3.703X_{14}} + \underset{(2.307)*}{2.777X_{15}} - \underset{(-0.181)}{0.0082X_{17}} + \underset{(0.698)}{0.0220X_{26}} + - \underset{(-0.546)}{0.000492X_{27}}$$
$$+ \underset{(2.960)*}{0.0175X_{28}} - \underset{(-0.0051)}{0.000627X_{29}} + \underset{(1.963)}{0.104X_{30}} - \underset{(-1.110)}{0.0257X_{31}} - \underset{(-0.377)}{0.0105X_{32}} + \underset{(0.0521)}{0.0521X_{33}}$$

For identification of variables see equation 1A.
(X^1 = Quantity of papayas sold both areas of investigation—Retail level.)
(X_3 = Wholesale price, San Franscisco and Los Angeles.)

r_2	= 0.202	r_{15}	= 0.399
r_3	= 0.321	r_{17}	= 0.260
r_4	= 0.826	r_{26}	= 0.186
r_5	= 0.328	r_{27}	= −0.135
r_6	= 0.322	r_{28}	= 0.247
r_7	= 0.049	r_{29}	= 0.284
r_8	= 0.320	r_{30}	= 0.329
r_{11}	= 0.346	r_{31}	= −0.050
r_{13}	= 0.294	r_{32}	= 0.113
r_{14}	= 0.187	r_{33}	= −0.050

$R^2 = 0.70145$ $D.F. = 1964$ $F = 200.628$

Equation 4A. Effect of prices of competing products on papaya prices, Sacramento and Redlands area

$$X_2 = 1.135 + \underset{(1.240)}{0.0188X_5} + \underset{(16.37)*}{0.948X_6} + \underset{(33.705)*}{0.438X_7} - \underset{(-8.197)}{0.319X_8} + \underset{(7.859)}{0.367X_{11}}$$

Where X_2 = Price of papaya (total sample)

X_5	= Price of cantaloupe	r_5	= 0.482
X_6	= Price of banana	r_6	= 0.877
X_7	= Price of fresh pineapple	r_7	= 0.805
X_8	= Price of white grapefruit	r_8	= 0.797
X_{11}	= Price of orange	r_{11}	= 0.843

$R^2 = 884$ $D.F. = 1979$ $F = 1900.0$

Figures in parenthesis = T

*Significant at the 1-percent level

Equation 5A: Demand for papayas (price as dependent variable), Sacramento and Redlands area

$$X_2 = 0.531 - \underset{(-2.421)^*}{0.0142X_1} + \underset{(19.614)^*}{6.063X_3} - \underset{(-3.284)^*}{0.0219X_4} - \underset{(-4.298)}{0.0566X_5}$$
$$+ \underset{(9.674)^*}{0.524X_6} + \underset{(22.492)^*}{0.299X_7} - \underset{(2.709)^*}{0.134X_{10}} + \underset{(0.827)}{0.0361X_{11}} - \underset{(-4.379)^*}{4.305X_{13}}$$
$$- \underset{(1.005)}{0.393X_{14}} + \underset{(0.2117)}{0.0665X_{15}} + \underset{(9.308)^*}{0.109X_{17}} + \underset{(0.497)}{0.00406X_{26}} + \underset{(6.4303)^*}{0.00142X_{27}}$$
$$+ \underset{(3.125)^*}{0.00481X_{28}} + \underset{(0.143)}{0.00456X_{29}} + \underset{(3.295)^*}{0.00454X_{30}} + \underset{(1.536)}{0.00926X_{31}} - \underset{(0.0468)}{0.000341X_{32}}$$

For identification of variables see equation 1A.
(X_3 = Wholesale price combined)

r_1 =	0.202	r_{15} =	0.578
r_2 =	0.911	r_{17} =	0.715
r_3 =	0.211	r_{26} =	0.089
r_4 =	0.482	r_{27} =	0.314
r_5 =	0.877	r_{28} =	0.131
r_7 =	0.805	r_{29} =	0.207
r_{10} =	0.550	r_{30} =	0.235
r_{11} =	0.843	r_{31} =	0.175
r_{13} =	0.0749	r_{32} =	0.159
r_{14} =	0.610	r_{33} =	−0.031

$R^2 - 0.9211$ $D.F. = 1964$ $F = 996.2$

Figures in parenthesis = T

*Significant at the 1-percent level

APPENDIX B
PROMOTION AND ADVERTISING EXPERIMENT SCHEDULES AND ANNOUNCEMENTS

The Golden Sound

KRNO | Radio 1240 |

Phone TUrner 5-6555
990 Colton Avenue
San Bernardino, California

April 19, 1967

Dear

Congratulations! As a bonus winner on the KRNO Golden Sound Booster Contest, you are in for an exotic, tropical treat! Yes, you are the winner of two nutritious, healthful papayas flown tree-ripened from Hawaii.

Your papayas will be at the KRNO studios on Wednesday, April 26 between 2 PM and 4 PM. We ask you to please come to KRNO between those hours to pick up your papayas. If for any reason you cannot be here on Wednesday, April 26 between 2 PM and 4 PM, please advise us immediately.

We know you will enjoy your golden papayas, and we hope you will continue to listen and enjoy the Golden Sound of KRNO.

Thank you for participating in our contest.

Best regards.

Cordially,

George Carroll
Vice President
General Manager

GC:bjg

BUY SUCCESS — BUY KRNO

The Golden Sound

KRNO | Radio 1240 |

Phone TUrner 5-6555
990 Colton Avenue
San Bernardino, California

UNIVERSITY OF HAWAII

PAPAYA SCHEDULE

ON

KRNO

SAN BERNARDINO, CALIFORNIA

WEEK APRIL 3

MON.	TUES.	WED.	THURS.	FRI.	SAT.
	5	8	9	9	5

WEEK APRIL 9

MON.	TUES.	WED.	THURS.	FRI.	SAT.
	5	8	9	9	5

TUES. THRU FRI.: BETWEEN 7:30 AM - 12 Noon
4:00 PM - 6:00 PM

SAT. ONLY: BETWEEN 9:00 AM - 12 Noon

BUY SUCCESS — BUY KRNO

Account UNIVERSITY OF HAWAII - PAPAYA #2Length ___ Date 4/3/67

PAPAYA -- TRULY A DELICIOUS FRUIT! ONE DELECTABLE SERVING CONTAINS ALL THE VITAMIN 'C' NEEDED BY AN ADULT FOR ONE DAY. HERE'S UNIQUE TROPICAL FLAVOR! LET A LUSCIOUS, SUNSHINE-RIPENED, RAIN-KISSED PAPAYA BRING HAWAII TO YOUR BREAKFAST TABLE. GET AWAY FROM THE ORDINARY ... TRY A NEW EXCITING, REFRESHING WAY TO START YOUR DAY. EXOTIC PAPAYA ... HEALTHFUL, NUTRITIOUS AND LOW IN CALORIES. PICK UP SEVERAL TODAY AT YOUR FAVORITE MARKET.

Account UNIVERSITY OF HAWAII - PAPAYA #1 Length __ Date 4/3/67

FOR AN EXOTIC, TROPICAL TREAT ... ENJOY A NUTRITIOUS, HEALTHFUL PAPAYA FLOWN TREE-RIPENED FROM HAWAII TO YOUR FAVORITE MARKET! TOMORROW, HAVE AN EXCITING START TO YOUR DAY, TRY SOMETHING DELIGHTFULLY DIFFERENT ... HAVE HALF A LUSCIOUS SUNSHINE RIPENED PAPAYA! HERE'S ANOTHER TASTE TREAT ... A REFRESHING PAPAYA MILKSHAKE OR GIVE YOUR FRUIT SALAD AN EXOTIC TASTE ... ADD A PAPAYA OR COMBINEA PAPAYA WITH OTHER FRUITS FOR A LUSCIOUS LOW CALORIE DESSERT. HIGH IN VITAMIN 'C', A DELIGHTFUL TASTE AND TEXTURE ALL ITS OWN. BRING HAWAII TO YOU TOMORROW FOR BREAKFAST ... PICK UP SEVERAL MOUTH WATERING PAPAYAS AT YOUR FAVORITE MARKET.

Account UNIVERSITY OF HAWAII - PAPAYA #3 Length ___ Date 4/3/67

HAVE THE SAME THING FOR BREAKFAST THIS MORNING? GETS RATHER BORING, DOESN'T IT? (SOUND) LIKE SOMETHING EXOTIC, REFRESHING? HOW ABOUT A DELIGHTFUL TASTE OF HAWAII ... A NUTRITIOUS, HEALTHFUL, ENERGY-FILLED PAPAYA ... WHAT A WAY TO START THE DAY! HERE'S ALL THE VITAMIN 'C' YOU NEED FOR YOUR DAY. AN EXCELLENT SOURCE OF VITAMIN 'A'. THERE'S A FINE SELECTION OF PAPAYAS JUST FLOWN TREE-RIPENED FROM HAWAII TO YOUR FAVORITE MARKET. PICK UP SEVERAL TODAY AND TOMORROW GET OFF TO A GREAT START WITH AN EXOTIC, SUNSHINE RIPENED TASTE TREAT ... A GOLDEN PAPAYA.

KRNO | Radio | 1240

MEMO

TO: **The Anners.** DATE: **4/3/67**

FROM: **George Carroll**

RE:

On each Booster Contest where we are awarding the Tossie's prize or the Luzianne, Bernsteins package ... after the person has chosen either one of these add the following:

"AND WE HAVE AN EXTRA BONUS FOR YOU. SOMETHING DELIGHTFULLY DIFFERENT WITH AN EXOTIC TROPICAL FLAVOR. YOU WILL HAVE FLOWN TREE-RIPENED FROM HAWAII TO YOU TWO SUNSHINE RIPENED PAPAYAS."

GC

310 10TH STREET SACRAMENTO, CALIFORNIA 95814 TELEPHONE 444-7300
NBC FOR NORTHERN CALIFORNIA'S MULTI-METRO-MARKET

February 24, 1966

SCHEDULE FOR UNIVERSITY OF HAWAII

March 7 thru March 29, 1966
All 60 Second Announcements

"PAPAYA"

Mon, 3/7	Valley Playhouse	2:30-4:00 PM
Wed, 3/9	Tonight Show	11:30-1:00 AM
Thur, 3/10	Today At Noon	12:00-12:25 PM
Fri, 3/11	TraVenture Theatre	5:30-6:00 PM
Sat, 3/12	Big 3 Golf	2:00 PM
Tue, 3/15	Tonight Show	11:30-1:00 AM
Wed, 3/16	Valley Playhouse	2:30-4:00 PM
Sat, 3/19	Sports In Action	2:00 PM

XVII

310 10TH STREET SACRAMENTO, CALIFORNIA 95814 TELEPHONE 444-7300
NBC FOR NORTHERN CALIFORNIA'S MULTI-METRO-MARKET

September 20, 1966
(Date)

AGREEMENT between UNIVERSITY OF HAWAII Called "advertiser" and KELLY BROADCASTING CO. called "station" to broadcast television programs and/or announcements as specified below:

for (Product): Papaya Promotion NAME OF PROGRAM: Announcements

LENGTH OF TELECAST	HOUR	DAYS	TIMES PER WEEK	TOTAL NO. WEEKS	TOTAL NO. TIMES
60"	11:30am	Wednesday	1	2	2
60"	4-5:30pm (ES)	Wednesday	1	2	2
60"	12-12:30pm (TAN)	Thursday	1	2	2
60"	4-5:30pm (ES)	Friday	1	2	2
60"	12-12:30pm (TAN)	Friday	1	2	2

IMPORTANT — All above listed times subject to change to telecast network programs.

DATE OF FIRST TELECAST September 28, 1966 | DATE OF LAST TELECAST October 7, 1966

ADDITIONAL INFORMATION (such as program material, talent, commercial announcements, arrangements, etc.)

UNIVERSITY OF HAWAII
COLLEGE OF TROPICAL AGRICULTURE
HAWAII AGRICULTURAL EXPERIMENT STATION
HONOLULU, HAWAII

THOMAS H. HAMILTON
President of the University

C. PEAIRS WILSON
Dean of the College and
Director of the Experiment Station

G. DONALD SHERMAN
Associate Director of the Experiment Station