MARKET RESPONSE TO TWO ALTERNATIVE PACKAGES FOR U.S. NO. 2 GRAPEFRUIT

John P. Nichols and Chan C. Connolly

SEPTEMBER 1972

Texas Agricultural Market Research and Development Center
Department of Agricultural Economics and Rural Sociology
Texas Agricultural Experiment Station, College Station
and the Texas A&M University Agricultural
Research and Extension Center at Weslaco

THE TEXAS AGRICULTURAL MARKET RESEARCH AND DEVELOPMENT CENTER

An Education and Research Service
of the
Texas Agricultural Experiment Station
and the
Texas Agricultural Extension Service

The purpose of the Center is to be of service to agricultural producers, groups and organizations, as well as processing and marketing firms in the solution of present, and emerging market problems. Emphasis is given to research and educational activities designed to improve and expand the markets for food and fiber products related to Texas agriculture.

The Center is staffed by a basic group of professional agricultural and marketing economists from both the Experiment Station and the Extension Service. In addition, support is provided by food technologists, statisticians and specialized consultants as determined by the requirements of individual projects.

Robert E. Branson, Ph.D.
Coordinator

William E. Black, Ph.D.
Associate Coordinator
Charles Baker, M.S.
Chan C. Connolly, Ph.D.
Robert L. Degner, M.S.
Johnny Feagan, M.S.
John P. Nichols, Ph.D.
Carl E. Shafer, Ph.D.
Thomas L. Sporleder, Ph.D.
Randall Stelly, Ph.D.
Edward Uvacek, Ph.D.
William J. Vastine, Ph.D.

TABLE OF CONTENTS

LIST OF TABLES

HIGHLIGHTS

- The research objective was to evaluate retail sales effectiveness of two types of 18 lb. packages for U.S. No. 2 grade Texas citrus. One was a mesh sack (or bag) and the other, a one-quarter standard box.

- A sales analysis was made for the two packages in a set of Fort Worth, Texas and St. Louis, Missouri food supermarkets. Customer and trade reactions were also obtained.

- The mesh sack outsold the one-quarter standard box of grapefruit by a ratio of from 2 to 1 up to 4 to 1.

- The package affected sales among the test supermarkets in two ways: it directly influenced consumer purchases and it influenced the produce manager's decision on grapefruit display space.

- An in-store survey of customers at the display found a preference for the mesh sack by a 4 to 1 ratio.

- The primary reason consumers preferred the sack was that it allowed good visibility of the grapefruit, while the quarter standard box did not.

- Most produce merchandizers in the test supermarkets preferred the mesh sack.

- Major reasons produce merchandizers preferred the sack were that it is more colorful as a display and is easier to merchandise.

- Contacts in other cities indicated that some firms may prefer the quarter standard box because it fits better into their handling and distribution system. Therefore, there is a segment of the market for which the quarter standard box is well suited.

- The retail market test indicated that improvements are desirable in the design of the quarter standard box to provide 1) better fruit visibility and 2) more ease in handling and carrying by consumers who purchase and by produce merchandizers who prepare the store displays.

MARKET RESPONSE TO TWO ALTERNATIVE PACKAGES FOR U.S. NO. 2 GRAPEFRUIT

John P. Nichols and Chan C. Connolly*

INTRODUCTION

Product packaging is an important factor in the successful marketing of Texas fresh citrus. It is a factor available to the Texas Citrus Industry, under Texas Oranges and Grapefruit Marketing Order No. 906, to assist in improving and developing markets for Texas citrus. Appropriate packaging not only considers efficiency, in terms of package cost, but also product protection, convenience in distribution, wholesaler and retailer acceptance, and effect on product sales at the retail level. It is very important, therefore, to evaluate periodically the effectiveness of package design as an aid to retail merchandising and market development.

The research discussed in this report was initiated at the request of the Texas Valley Citrus Committee for the purpose of evaluating two alternative packages for U.S. No. 2 grade fresh citrus at the retail level. Partial financial support for the research was provided by a grant from the Texas Valley Citrus Committee.

For the two seasons (1968-69 and 1969-70) U.S. No. 2 quality accounted for approximately 30 percent of fresh grapefruit shipments

---

*Assistant Professor, Texas Agricultural Experiment Station, Texas A&M University, College Station and Associate Professor, Texas Agricultural Experiment Station, Agricultural Research and Extension Center, Weslaco, Texas.

from the Texas Rio Grande Valley. Most of the U.S. No. 2 quality grapefruit has been shipped in mesh sacks (a 20 pound size was used prior to the 1970-71 season). The mesh sack is used primarily only by Texas shippers and for grapefruit marketed in Texas, the Great Plains and Midwest areas of the United States. U.S. No. 2 grade Texas oranges have likewise been shipped in the mesh sack.

An obvious problem of the mesh sack is that it does not adequately protect the fruit from physical damage in shipment. Master cartons are not used to protect the product so packed from physical damage. Straight loads contain from 1800 to 2000 18-pound mesh sacks and are typically stacked 10 sacks high, equivalent to about 7 feet. This creates a heavy pressure on the bottom sacks. When the lot reaches the market, grapefruit in the bottom mesh sacks are often damaged and the buyers request adjustments from the shipper. In addition, the sacks are not readily adaptable to palletizing, or unitizing, for handling efficiency either in shipment or at the wholesale warehouse or in the retail store.

The development of a cardboard carton designed to hold approximately the same amount of fruit (one-quarter standard box) provides protection to the fruit from physical damage and is more adaptable to palletizing. The effectiveness of such a package as a merchandising tool, however, needed to be evaluated. Its merchandising performance only, as compared to the mesh sack, is the subject of the research summarized in this report.

The research objectives established for the retail store market test were as follows:

1. To measure the relative sales effectiveness of the two alternative packages.

2. To evaluate customer reaction to the two package alternatives.

3. To examine the attitudes of trade personnel at wholesale and retail level regarding the two alternative packages.

4. To provide a total evaluation of the two packages by considering the combined effect of all these factors.

PROCEDURE

The in-store experiment was designed to examine the effect of the two packages on retail sales. Ft. Worth, Texas and St. Louis, Missouri were selected as test markets. In each city 12 stores were selected to provide a representative sample of each market. One food chain was used in each city to minimize differences due to management policies.

Three treatments were set up using various alternatives of the two packages tested. They were as follows:

A. Independent display of only mesh sacks in the retail stores.

B. Independent display of only one-quarter standard boxes in the retail stores.

C. Joint display of both bags and one-quarter standard boxes in the stores.

The three treatments were rotated over time among the stores so that during any particular week all treatments were represented. Treatments were rotated every two weeks. The same price was charged for both the sack and the one-quarter standard box. No control was exercised over the price or merchandising of any other grapefruit items. The normal pattern of store operations was maintained so that the environment in which the test was conducted was representative of actual market conditions.

Visits were made to each store twice a week. Inventories were taken and data were collected on sales volume, price and display space for each grapefruit item once a week for each store. Data on weekly customer count by store were also collected.

The customer survey evaluation was conducted in the St. Louis stores during the 4th and 5th week of the test. A sample of 205 grapefruit purchasers were interviewed in stores which had the joint display of both mesh sacks and one quarter standard boxes. In-store interviews were conducted regarding preferences for the two packages and reasons for selection. The interviews were initiated after the customers selected a grapefruit product.

The reactions of various members of the trade were obtained through personal contacts during the course of the study. Product buyers, produce merchandisers, warehouse managers, and store level produce managers were included in this group.

Limitations

As will be noted later, a significant adverse reaction was encountered among some produce department managers regarding the quarter standard box. Because of low acceptance resulting in slow movement, it was necessary to discontinue the research effort in Ft. Worth, Texas before the experimental design was fully completed. While this limited the data available for analysis, sufficient information was gathered to provide a sound basis for the evaluation of the two test packages.

RESULTS

Following is an evaluation of the two test packages in terms of retail sales data, customer reaction, and trade reaction.

Sales Analysis

The three treatments A, B and C were rotated among stores over time using a latin square research design. Data from the independent displays (mesh sack or carton) were evaluated separately from those for joint displays (mesh sacks and cartons).

Independent Displays

The term "independent display" refers to those situations where only one test package (18 lb. mesh sack or one quarter standard box) appeared in the retail store at a time. This was considered representative of a typical marketing situation, since a store is not likely to handle both. Average sales, in terms of pounds of No. 2 grapefruit sold per 1,000 customers, for each of the two test packages, in each of the two market test areas, is given in Table 1.

The sales data are expressed in pounds per 1,000 customers since total sales are affected by the number of customers from store to store and week to week. In St. Louis an average of 2.6 mesh sacks sold to each quarter standard box. In Ft. Worth the ratio was 2.1 to 1, also in favor of the mesh sacks. When tested statistically, these market test sales differences were found to be highly significant.

Table 1. Independent Display: Mean Pounds of U.S. No. 2 Texas Grapefruit Sold Per 1,000 Customers as Affected by Alternative Packages, St. Louis and Ft. Worth Test Stores, February 15 - March 20, 1971.

City	Sales per 1,000 Customers		Sales Ratio
	mesh sack	one-quarter standard box	sack/box
	- - - pounds - - -		
St. Louis*	77.13	29.46	2.6 to 1
Ft. Worth*	67.01	32.18	2.1 to 1

Source: Computed from primary data.

*Difference between sack and box is significant at the .01 level.

It should be noted at this point that two factors had a major influence on the differences in sales per 1,000 customers observed between sacks and one-quarter standard boxes. One was a difference in display space allocation for the two types of test packages. The second was a basic difference in customers' preferences between the two packages. Table 2 shows the average shelf space allocated to each. Especially in the St. Louis test stores, a greater amount of display space was allocated to the mesh sacks.

Display space combined with sales data provides information on pounds sold per square foot of display space per 1,000 customers. These data appear in Table 3. On this basis, too, the mesh sack sales exceed quarter standard box sales. The magnitude of the difference was reduced, however, and was not found to be statistically significant at the 10 percent level.

One of the important market test findings was that a difference in shelf space did exist which, in turn, caused a significant part of the lower sales per 1,000 customers for the box. Thus the box had a two-fold effect: 1) it adversely affected the consumer and 2) it affected negatively the produce manager's decision regarding the amount of retail shelf space allocated, and this in turn affected the sales per 1,000 customers. An improved form of the box might overcome these problems.

Because of this dual effect on retail sales, it is better to evaluate the combined effect of shelf space and type of package by paying primary attention to sales per 1,000 customers.

Table 2. Independent Display: Mean Shelf Space Per Store as Related to Package Alternatives, St. Louis and Ft. Worth, February 15 - March 20, 1971.

City	Shelf Space Per Store	
	mesh sack	one-quarter standard box
	- - - square feet - - -	
St. Louis	19.7	8.4
Ft. Worth	13.9	10.2

Source: Computed from primary data

Table 3. Independent Display: Mean Pounds of U.S. No. 2 Texas Grapefruit Sold Per Square Foot Per 1,000 Customers as Affected by Alternative Packages, St. Louis and Ft. Worth, February 15 - March 20, 1971.

City	Sales per square foot per 1,000 customers		Sales Ratio
	mesh sack	one-quarter standard box	sack/box
	- - - pounds - - -		
St. Louis*	4.55	3.44	1.3 to 1
Ft. Worth*	6.23	3.37	1.8 to 1

Source: Computed from primary data

*Differences between sack and box are not significant at the .10 level.

Joint Display

The term "joint display" refers to treatment C in the rotational design where both the 18 lb. mesh sack and the one quarter standard box were displayed in the same store at the same time.

Average sales per 1,000 customers is summarized in Table 4 for both the 18 lb. mesh sack and for the one-quarter standard box. The mesh sack had a much higher sales level than the quarter standard box. This was especially true in the Ft. Worth test stores where the ratio of pounds sold per 1,000 customers was 4.3 to 1 favoring the mesh sack. This difference was statistically significant at the 1 percent level.[1/]

If the difference in shelf space allocation is removed, bagged fruit sales were still significantly larger than those for boxes (Table 5). Thus shelf space factor was less important in affecting sales in the joint displays than it was for independent displays.

Discussion

Examination of the results from both the independent and joint displays yields several observations. First, and most important, in both test situations in both cities, the mesh sacks generated a higher level of retail sales than the quarter standard boxes.

Second, the effect of the package on the size of the display was important in the independent display tests. The relative display space was less important in the joint display tests. One explanation for this may be that when both packages are displayed, the customer's preference

---

[1/] A paired "t" test was used to measure statistical differences.

Table 4. Joint Display: Mean Pounds of U.S. No. 2 Texas Grapefruit Sold Per 1,000 Customers as Affected by Alternative Packages, St. Louis and Ft. Worth Test Stores, February 15 - March 20, 1971.

City	Sales Per 1,000 Customers		Sales Ratio
	mesh sack	one-quarter standard box	sack/box
	- - - pounds - - -		
St. Louis*	34.22	19.49	1.8 to 1
Ft. Worth**	78.52	18.36	4.3 to 1

Source: Computed from primary data.

*Difference between sack and box significant at .05 level.

**Difference between sack and box significant at .01 level.

Table 5. Joint Display: Mean Pounds of U.S. No. 2 Grapefruit Sold Per Square Foot Per 1,000 Customers as Affected by Alternative Packages, St. Louis and Ft. Worth Test Stores, February 15 - March 20, 1971.

City	Sales Per Square Foot Per 1,000 Customers		Sales Ratio
	mesh sack	one-quarter standard box	sack/box
	- - - pounds - - -		
St. Louis*	3.95	2.04	1.9 to 1
Ft. Worth*	7.09	2.11	3.4 to 1

*Difference between sack and box significant at the .01 level.

is more important than the relative amount of space given to the product. The customer is in a better position to make a decision without being influenced by relative shelf space.

In the following section, a discussion of the customer reaction survey will provide more insight with respect to reasons for the consumers' preference for the 18 pound mesh sack.

Customer Reaction

In the test supermarkets, 205 interviews were completed with grapefruit purchasers. Approximately one-third had bought either the 18 pound mesh sack or the one-quarter standard box. Two-thirds purchased smaller units of grapefruit. All interviews were in stores with joint displays (treatment C in the rotational design), so both test packages were on display.

The main objective of the interviews was to determine shoppers' preference between the 18 pound bag and the quarter standard box Approximately 82 percent said they preferred the 18 pound mesh sack; only 18 percent picked the one-quarter standard box. The same results were obtained from those purchasing smaller units as were elicited from purchasers of the test packages (Table 6).

Following this question were a series of questions regarding the reasons for the preference expressed. The reasons for preference of the mesh sack are summarized in Table 7. The most often expressed reason for preferring the sack was that it afforded much better visibility of the product. This accounted for 50 percent of the responses. An additional

Table 6. Customer Preference for Mesh Bag Versus Box of Grapefruit, St. Louis, March, 1971.

Size Unit Customer Purchased	Customer Preference	
	mesh sack[1/]	one-quarter standard box[2/]
	- - - percent - - -	
18 pounds (mesh sack or quarter standard box)	81	19
Under 18 pounds (from bulk or other displays)	82	18
Total for all sizes purchased	82	18

[1/] Total of 165 completed interviews.

[2/] Total of 37 completed interviews.

Source: Completed questionnaires.

Table 7. Customer Survey: Reasons for Preference of Mesh Sack, St. Louis, March, 1971.

Reasons for Preference of Sack	Percent of Responses[1/]
Product more visible	50
Easier to carry	23
Easier to handle and store at home	8
Fruit would stay fresher	5
Easily disposable container	5
Looked nicer and more colorful in display	3
Miscellaneous comments	6
	100

[1/] Based on 224 total responses

Source: Completed questionnaires

23 percent noted that the sack was easier to carry. Other reasons included ease of handling and storage at home, easily disposable container, thought that the fruit would stay fresher in the sack, and looked nicer in the display.

The most often mentioned reason for preferring the quarter standard box (Table 8) was that it would be easier to store and handle at home (35%). An additional 21 percent said it would be easier to carry while 16 percent felt it would be better for shipping and display. Also mentioned was the usefulness of the empty carton as a container for other purposes.

When asked what was disliked about the package they did not prefer, the reasons given were generally the opposite of the reasons for preferring the other package. Of those that preferred the mesh sack, 48 percent indicated they disliked the quarter standard box because it gave poor visibility of the product. Another 13 percent said it was hard to carry.

Of those that preferred the box, 28 percent said that the mesh sack was inconvenient to store at home. An additional 10 percent said that the fruit would be more easily damaged in the sack.

When asked about possible improvements in their preferred package, 36 percent of those that preferred the box suggested that the visibility of the product should be increased. Other improvement possibilities noted were attractiveness of the quarter standard box and the convenience and handling characteristics of the mesh sack.

Demographic data were also obtained along with frequency and usual size of grapefruit purchases. An analysis of cross-tabulations indicates

Table 8. Customer Survey: Reasons for Preference of the One-Quarter Standard Box, St. Louis, March, 1971.

Reasons for Preference of Quarter Standard Box	Percent of Responses [1/]
Easier to store and handle at home	35
Easier to carry	21
Better for shipping and displaying	16
Reusable container	7
Miscellaneous comments	21
	100

[1/] Based on 43 total responses.

Source: Completed questionnaires.

that responses to the preference question and reasons given were not influenced by these factors.

In summarizing the results of the customer survey it is evident that a strong preference exists for the mesh sack relative to the quarter standard box. A ratio of about 4 to 1 favored the sack. The most apparent problem mentioned regarding the box was the fact that the purchaser could not see the fruit adequately indicating a significant problem of product visibility at the retail level.

Trade Reaction

The reactions of people within the trade varied widely. Essentially they may be classified into two groups: 1) those concerned with merchandising the product and 2) those concerned with its physical handling and distribution. This analysis is a summary of the reactions observed during the period of study.

The group directly involved in the selling of the product (chain level produce merchandisers, supervisors and store produce managers) generally favored the mesh sack over the box. Most of the reasons cited related to its merchandising characteristics. The mesh sack is colorful and adds to the color scheme of the whole produce department. The one quarter standard box lacked this attribute. Many produce managers expressed a strong dislike for the box because it detracted from the appearance of the entire produce department. Some said that since no other produce products are sold in a closed container of this size, many

customers thought that the quarter standard boxes had not been unpacked and were not for sale. Others said it made their department look like a warehouse.

When the box cover is removed from the quarter standard box the skin discoloration permissible on the No. 2 grapefruit is more evident than in the mesh sack. The same fruit in the mesh sack is enhanced in appearance by the yellow color of the mesh sack. Produce merchandisers felt that this was a serious problem with the box especially with U.S. No. 2 grade grapefruit when skin discoloration may occasionally become very significant.

Some instances were observed where the quarter standard box was used very effectively in a display and was merchandised quite well. However, it requires much more work to do a good job with the quarter standard box than with the mesh sack and labor is usually a scarce resource in the produce department.

Some preferences for the box were expressed by those people involved in warehousing and handling the product. The reasons revolved around the fact that it lends itself to palletizing even on mixed pallets going to individual stores. It was recognized, however, that this advantage didn't mean much if the product could not be sold at the store. Another factor should also be noted in connection with this aspect of the packages. Some chains may insist on having a package which will fit into their handling system or they will not handle the product at all. In these situations the handling aspect is the overriding concern and the box may be the most appropriate package.

Additionally it was noted that the single wall boxes were easily crushed on the corners and the appearance of the container suffered. This was noticeably less of a problem with the boxes which had telescope tops because of the double wall strength.

CONCLUSIONS AND IMPLICATIONS

It is generally concluded that the 18 pound mesh sack is a superior merchandising package when compared to the quarter standard box as currently available. As such it is preferred by the trade and results in significantly greater customer acceptance and maintains a higher level of sales. There is no evidence, either in the sales test or the customer reaction survey, to indicate that the quarter standard box can equal the mesh sack.

There does exist, however, a small potential market for the quarter standard box. For those firms which will not handle the product at all unless the package is convenient and economical to handle (or fits into their distribution system) the quarter standard box may indeed be a suitable package.

It also should be recognized that some of the basic reasons for dislike of the box type package are known. Most of these revolve around the lack of visibility of the product. With further design modifications the visibility may be improved and the impact of this problem reduced. Additional modifications of the color and strength of the package would also be helpful.

The following are more specific statements of conclusions which may be drawn from this study.

1. The mesh sack generates greater sales than the quarter standard boxes. In most cases the sales advantage ranged from 2 to 1 up to 4 to 1 favoring the mesh sacks.

2. The effect of the package was exhibited in a two-fold manner; a direct effect on the customer purchase decision and an effect on the amount of shelf space given to the produce by the produce manager.

3. The mesh sacks generally received greater shelf space which assisted in improving sales.

4. Customers preferred the sack over the quarter standard box by a 4 to 1 ratio after observing a store display containing both test packages.

5. The most important problem with the quarter standard box is that the fruit cannot be seen adequately by the consumer.

6. The mesh sack is considered by produce managers and merchandisers to be the better merchandising package as it enhances the appearance of the product.

7. Some preference for the box exists in handling and warehousing. While this generally does not override the merchandising factors, for some firms it may be the most important consideration.

While these results and conclusions specifically relate to U.S. No. 2 Texas grapefruit, it is apparent from the magnitude and nature of the preferences expressed that similar results would be observed if a similar test were conducted with Texas oranges in the quarter standard box.

It is evident from the results of this study that both packages are important in a total marketing program. While the mesh sack is generally the better container from a merchandising point of view, some segments of the market may demand the quarter standard box because it fits better into their handling and distribution system. Improvements in the merchandising characteristics of the quarter standard box must be considered, however. Having both types of packages available is important in serving the varying demands of the many segments of the market.