The University of Southwestern Louisiana

Lafayette, Louisiana

Research Series No. 42

MARKETING

CRAWFISH TEST MARKET STUDY

HOUSTON, TEXAS

by

James C. Carroll, Ph.D.
Robert S. Franz, Ph.D.
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Chapter I

INTRODUCTION

The South Louisiana crawfish industry has been and continues to be a highly localized industry. In fact, a study completed in 1974 revealed that over 85 per cent of Louisiana's crawfish crop is still marketed within the state.[1] Nevertheless, many crawfish growers, crawfish processors, and government officials in Louisiana believe that the future growth of the industry will depend in part both upon the expansion of existing markets and the development of new markets for crawfish products.

In the past several years, attempts have been made to market crawfish in more distant locations. At least three crawfish processors have tried to sell crawfish in European markets and in several midwestern and northern United States cities. Unfortunately, in the final analysis, each of these ventures proved to be unsuccessful and the question remained as to whether or not it would be feasible to market crawfish in locations other than Louisiana. In view of this situation, researchers in the Department of Marketing at the University of Southwestern Louisiana felt that a carefully conducted test market study of the acceptance of crawfish in a non-Louisiana city would be justified.

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[1]James C. Carroll and Holland C. Blades, Jr., A Quantitative Analysis of the Amounts of South Louisiana Crawfish that Move to Market Through Selected Channels of Distribution, The University of Southwestern Louisiana, Research Series Number 35, October, 1974.

The researchers believed that the best results could be achieved in a major metropolitan area located in a state bordering Louisiana. In addition, the city chosen for the test market would have to be within reasonably easy reach of the research team's headquarters in Lafayette, Louisiana. After consideration of several cities, Houston, Texas was chosen as the test market city that best fit these general requirements.[2]

Statement of the Problem

The general problem dealt with by this investigation centered on the question of whether or not crawfish could be successfully marketed in a major city outside Louisiana. Specifically, it was not known what difficulties would be encountered in a test market area when attempting to convince marketing institutions such as wholesale seafood markets, grocery stores, restaurants, and retail seafood markets to handle crawfish products for the first time. No information existed as to the total quantity of crawfish that could be sold through each type of marketing institution. In addition, it was not known what type of crawfish products or dishes would prove to be most popular with non-Louisiana consumers. Information pertaining to these basic questions were needed to help answer the question of whether or not an out-of-state market could be developed for Louisiana crawfish products.

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[2]For purposes of this study, Houston, Texas should be considered to mean the Houston, Texas Standard Metropolitan Statistical Area. This area includes the counties of Brazoria, Fort Bend, Harris, Liberty, Montgomery, and Waller. A description of the Houston, Texas test market area is contained in Chapter II of this study.

Specific objectives of the research project were as follows:

(1) To determine the total quantity of crawfish tail meat that could be sold in participating restaurants, seafood markets, and food stores during the test market period.

(2) To determine the total quantity of live crawfish or other crawfish products sold in participating restaurants, seafood markets, and food stores during the test market period.

(3) To rank the relative importance of restaurants, food stores, and seafood markets as channels of distribution for crawfish products.

(4) To estimate the total demand for crawfish tail meat and other crawfish products in the entire Houston, Texas metropolitan area.

(5) To determine the most popular crawfish products sold in seafood markets and food stores and the most popular crawfish dishes served in restaurants.

(6) To determine consumers' reactions to crawfish products.

(7) To evaluate various promotional devices such as: television appearances, newspaper and radio advertisements, and point-of-purchase promotional materials.

(8) To document problems related to persuading managers and owners of retail outlets to sell crawfish products for the first time.

(9) To determine the nature of logistical and communication problems faced by Louisiana crawfish processors and dealers when selling in out-of-state markets.

(10) To estimate demand for crawfish in other Texas cities based on test market results.

Research Procedures

Scope and Structure of the Study

The scope and structure of the Houston test market project were influenced in part by the findings of crawfish research projects already completed in South Louisiana.[3] First, because of the short life of

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[3]A discussion of past research regarding the marketing of crawfish is contained in Chapter II of this study.

crawfish out of water, it was felt that the bulk of the crawfish sold outside of Louisiana would be in the form of peeled tail meat. Therefore, the major thrust of the study concentrated on the sale of chilled or frozen crawfish tail meat. Past research had also shown that the major south Louisiana distribution channels for crawfish products included restaurants, food stores, and seafood markets and the decision was made to focus the investigation on these types of retail outlets. Previous research conducted in Lafayette had also shown that non-native South Louisiana crawfish consumers were from higher socio-economic backgrounds. Therefore, an effort was made to focus attention on higher quality restaurants, food stores, and seafood markets during the Houston test market study.

Data Sources

In planning the Houston test market project, past research reports concerning crawfish were consulted. In addition, standard references on test marketing procedures were reviewed. Finally, in order to become familiar with the city of Houston, Texas, secondary data were collected on the socio-economic and geographic characteristics of the city. However, because of the unique nature of the project, most of the data generated were primary.

Because there are several thousand restaurants, seafood markets, and food stores in Houston, it was possible to contact only a limited number of establishments. At the start of the study a total of six seafood markets, eleven restaurants, two hotels, and three food stores were contacted. Of these totals, seven restaurants, six seafood markets, one hotel, and six food stores agreed to participate in the research project. While the data sources should be thought of as a convenience sample, they were nonetheless geographically well-distributed throughout the city.

Data Collection Methods

Data collected during the study were obtained from owners and managers of the participating outlets by means of personal interviews. The data were collected by using a questionnaire of the kind shown in Appendix I. The data were obtained at one week intervals and summarized at the end of the test market period.

Problems Encountered in Data Collection

Because of limited time and the financial constraints of the research, it was impossible to make the repeat visits necessary to contact each restaurant, seafood market, and food store on a weekly basis. The distance of Houston from Lafayette and the geographic dispersion of cooperating retail outlets within Houston were the prime causes of this problem. The problem of contacting outlets and conducting other business connected with the project was overcome to some degree by employing a graduate student from the University of Houston as a project assistant.

It was also found that some outlets were slow in compiling data and making it available to the investigators. While this slowed the data collection to some extent, it was not a major problem.

Organization of the Report

The subject material presented in the subsequent chapters of the report are as follows.

Chapter II summarizes previous studies on the subject of crawfish marketing, and gives a brief description of the political, social, and economic characteristics of Houston.

Chapter III contains a summary of the Houston test market activities, a presentation of the data obtained, and a review of promotional activities during the project.

Chapter IV summarizes the research findings, presents the conclusions with respect to the findings, and makes recommendations for additional research.

CHAPTER II

REVIEW OF THE LITERATURE AND STUDY SETTING

Review of the Literature

Research devoted to the development of the South Louisiana crawfish industry was focused largely upon production and processing problems until the fall of 1972, when a research group in the Marketing Department of the University of Southwestern Louisiana began a series of projects to investigate marketing problems of the industry. These marketing research projects were aimed primarily at understanding the crawfish industry and at determining the feasibility of attempting to develop out-of-state markets for South Louisiana crawfish.

These studies produced a considerable amount of valuable information concerning: (1) the demographic characteristics of non-native users of South Louisiana crawfish; (2) product preferences of non-native crawfish product users; (3) channels of distribution for crawfish products; and (4) potential for expansion of the supply of crawfish and for expansion of processing facilities. A list of the completed research projects performed at the University of Southwestern Louisiana in the areas of crawfish production, crawfish processing, and crawfish marketing is shown in Appendix IV. Although these studies have answered many questions, they have identified many more questions which need to be answered before the industry can develop to its full potential.

Records show that crawfish production, distribution, and consumption in South Louisiana has been of some commercial significance for at least 80 years.[1] The predominant edible genus of crawfish is the red procambarus.[2] Its native habitat is the flood plain of the lower Atchafalaya River, an area approximately 15 miles wide and 75 miles long. Until domestic production of crawfish began in 1949 in ponds and rice fields, the Atchafalaya Basin was, for practical purposes, the only source of supply for commercial crawfish. Even today, the wild crawfish from the Atchafalaya Basin constitute approximately half the annual commercial catch.[3]

Today, the major crawfish producing parishes in South Louisiana are Assumption, Acadia, Evangeline, Lafayette, St. Landry, St. Martin, and Iberville. At present, most of the estimated 42,000 acres of crawfish ponds and crawfish producing rice fields are located in the parishes of Acadia, Evangeline, Lafayette, and Vermilion. The principal crawfish landings are immediately adjacent to the Atchafalaya Basin, near Pierre Part, Belle River, Breaux Bridge, St. Martinville, and Catahoula.

Crawfish are caught from November through June by commercial fishermen who take the wild crawfish from the Atchafalaya Basin and the domestic crawfish from the ponds and rice fields. Most wild crawfish are sold

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[1] Malcolm L. Comeaux, "Historical Development of the Crayfish Industry in the United States," paper presented to the 2nd International Crayfish Symposium, April, 1974.

[2] James W. Avault, Jr., "Crayfish Farming in the United States," paper presented to the 1st International Crayfish Symposium, September, 1972.

[3] Comeaux, op. cit.

by fishermen directly to processing plants. Domestic crawfish are sold by fishermen (who pay the pond or rice field owner to fish) or by the pond or rice field owner (who pays the fishermen for his labor) directly to the processing plant. Although some crawfish are sold by fishermen directly to restaurants and seafood markets, the bulk of the commercial crop moves through the processing plants.[4] Restaurant proprietors usually prefer to procure crawfish from processing plants in order to be assured of a stable source of supply.[5]

Processing plants sell live crawfish and peeled crawfish tails to seafood markets, restaurants, and food stores. There are now approximately 40 processing plants operating in South Louisiana. They are located at the major crawfish landings, with the heaviest concentration being in the Breaux Bridge and St. Martinville areas. The methods of operation of the various processing plants differ somewhat. Some of the plants sell a large portion of their volume in the live state and engage in peeling operations only in order to salvage tail meat which could not otherwise be sold profitably. The problem which necessitates this mode of operation is the short life of the crawfish out of water (about three days under optimum conditions). Other plants concentrate their efforts upon the peeling operation and sell the bulk of their volume as peeled tail meat. In a short supply season, the high price paid per pound for live crawfish together with the relatively high labor cost of peeling can make the peeling process a marginal operation of questionable profitability.[6]

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[4] James C. Carroll and Holland C. Blades, Jr., A Quantitative Analysis of South Louisiana Crawfish That Move to Market Through Selected Channels of Distribution, University of Southwestern Louisiana, Faculty Research Series No. 35, October, 1974.

[5] Ibid.

[6] Ibid.

From the processing plants the crawfish move to market via seafood markets, restaurants, and food stores. The three largest metropolitan consumer markets for crawfish products are New Orleans, Baton Rouge, and Lafayette. Seafood markets often sell crawfish in the live state as well as in the form of chilled tail meat. Restaurants offer a variety of crawfish entrees such as etouffee, bisque, jambalaya, gumbo, fried tails, and stew. Food stores normally restrict their product offering to packaged tail meat, either frozen or chilled.[7]

During the 1974 season, approximately 14,500,000 pounds of crawfish, both pond grown and wild crawfish, moved to market through the processors. A survey of processors that year indicated that capacity could have been increased by approximately 60 per cent without expanding existing facilities. The processors further stated a willingness to expand their facilities by about 63 per cent, if shown ample evidence of both dependability of supply and demand. It was estimated that approximately 35,000,000 pounds of crawfish could be handled by processors currently in operation, if working at full capacity.

While there are presently approximately 42,000 acres devoted to crawfish farming it is estimated that a total of about 200,000 acres could be farmed. Assuming good pond management and optimum conditions, total annual crawfish production from ponds could be in excess of 100,000,000 pounds. One estimate of the crawfish harvest from the Atchafalaya Basin in 1973, a very good season, was 25,000,000 pounds.

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[7]Holland C. Blades, Jr., "The Distribution of South Louisiana Crawfish," paper presented to the 2nd International Crayfish Symposium, April, 1974.

The Atchafalaya Basin, however, is not subject to control as are ponds. An optimum estimate of the total potential for crawfish production in South Louisiana is 125,000,000 pounds annually.[8]

Although some crawfish have been sold for several years in the cities of southeast Texas and southern Mississippi, little effort has been made to develop markets outside the state of Louisiana.

Successful marketing of crawfish outside of Louisiana can occur only if consumers are offered a product they prefer and retailers are provided an incentive to stock and sell the product. (Marketing plans cannot be successful if consumers do not like a product. However, even if consumers like a product, they will be unable to purchase it if retailers choose not to add the item to existing product lines.) Many retailers are unwilling to add crawfish products unless they believe the products will represent a source of additional profits. In order to generate additional profits, crawfish products must add to the retailers' sales without adding significantly to his costs. Retail middlemen are usually hesitant to make large initial investments in equipment for storing and preparing a product which has not proven itself in their market.

Before the Houston test market study was undertaken, researchers at the University of Southwestern Louisiana undertook two studies of crawfish

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[8] Robert S. Franz, An Investigation of the Potential for Expansion of the Supply of Louisiana Crawfish and Crawfish Processing Facilities, University of Southwestern Louisiana, Faculty Research Series, No. 34, October, 1974.

consumers who were non-natives of South Louisiana. These studies recognized that for a test market to be successful it would be necessary to first identify a target market segment, and then to adapt the product, promotional effort, distribution plans, and terms of sale to the needs of the target market.

The initial study of non-native crawfish consumers was conducted during the spring of 1973 and sought to identify those segments of the non-South Louisiana consumer market representing the best opportunity for expanding crawfish sales. Based on an analysis of responses to a mail questionnaire, households representing the best market opportunities tend to:

1. have a household income of $12,500 or more per year
2. have a head of household 30 years old or over
3. have a head of household engaged in a "white collar" occupation
4. have dependent children living in the home
5. have a head of household with an advanced college degree.[9]

Based on these findings, a second study was conducted during the spring of 1974 in order to determine the specific crawfish dishes the above household segments consumed in the greatest quantity and where the crawfish was consumed. Analyses of crawfish consumption reported by a consumer panel revealed that a majority of the crawfish meals (56 per cent) were consumed in restaurants and cafeterias. Most of the meals consumed in restaurants and cafeterias (84 per cent) were prepared from peeled tails rather than live crawfish. Crawfish prepared in the home accounted for 17 per cent of the total consumption. Most of the "home cooked" meals (57 per cent) were

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[9] Thomas F. Griffin, III, An Identification of Early Adopters and Heavy Consumers of Crawfish Among Non-Natives of South Louisiana, The University of Southwestern Louisiana, March, 1974.

also prepared from peeled tails. The remaining 27 per cent of the total consumption was prepared in the homes of friends or relatives.[10]

Previous studies suggest a number of conclusions. First, the crawfish processing industry is characterized by many small operators with no one firm or group of firms exerting a controlling influence. Second, the crawfish industry is a local operation. Third, people now dealing in crawfish tend to think of their market as being located almost exclusively in South Louisiana. Fourth, many of the more progressive industry members now appear to believe that continued development of the crawfish industry will depend upon marketing crawfish in areas outside South Louisiana and employing more modern marketing techniques in these ventures.

The Study Setting

After studies of the structure of Louisiana's crawfish industry, distribution channels for crawfish products, the potential for development of the crawfish industry, and usage practices of non-native South Louisiana crawfish consumers had been completed, the question still remained as to whether sizeable markets for crawfish existed outside of Louisiana. It appeared that an organized effort to market crawfish products in a non-Louisiana city could answer this question. Therefore, in the spring of 1974, a decision was made to test market crawfish in at least one major city outside of Louisiana.

For several reasons, Houston, Texas appeared to be the most logical choice to serve as the test market city. First, Houston is a major

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[10]Thomas F. Griffin, III, A Study of the Consumption of Various Crawfish Dishes Among Non-Natives of South Louisiana, The University of Southwestern Louisiana, October, 1974.

population center with a diversified population and retailing structure. Second, because of the dynamic nature of Houston's economy and the city's rapid population growth, it was believed that consumers of crawfish products in this market would include individuals from throughout the United States and indeed the world. Third, because of the distance from Lafayette, Louisiana to Houston (approximately 200 miles), it would be possible for the research team to maintain contact with the firms participating in test market operations. Fourth, it was believed that Houston constituted a representative base from which the data and information collected could be generalized and applied to crawfish marketing in other metropolitan areas outside of South Louisiana.

In order to appreciate the setting for the test market, it should be understood that metropolitan Houston is a dynamic, fast-growing and modern city. Houston is now one of the largest cities in the southwest, and ranks sixth in the nation in terms of population of incorporated areas. As of January, 1974, population of the Houston Incorporated Area was 1,386,000 and the population of Harris County, Texas was 1,942,000.

Houston is a large port and serves as the import and export gateway for Texas and the southwest. Through this port flow the products of both the southwestern and midwestern areas of the United States. Houston is located about 50 miles from the Gulf of Mexico. However, ocean-going vessels reach the Port of Houston through a 40-foot deep, 400-foot wide channel dredged from the Gulf to a Turning Basin, almost in the heart of the city. It was the opening of this channel in 1914 that marked the beginning of Houston's growth to a major American city.[11]

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[11]Information supplied by Houston, Texas. Chamber of Commerce.

Houston serves as the hub of the giant oil and petrochemical industries of the southwest. Many refineries are located here or in adjacent cities which have risen from the farmland around Houston. The site of the Lyndon B. Johnson Space Center, Houston is now the "Space Capital" of the United States. Rice, cotton, and cattle are the major farming and ranching industries of the Houston area, and the Port of Houston is unsurpassed among the nation's ports in oil and cotton tonnage moved annually.[12]

Houston, Texas holds a prominent place in the commercial life of the southwest United States. It is a port city, an industrial center, as well as one of the region's largest retailing centers.[13] Commercially and economically, Houston dominates the region defined as the Houston, Texas Standard Metropolitan Statistical Area.[14]

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[12] Ibid.

[13] Ibid.

[14] Ibid.

The following information presents a brief description of the Houston, Texas ranking among major United States metropolitan markets:[15]

Category	Rank	Total
Population	13	$ 2,197,000
Households	13	715,200
Effective Buying Income	15	9,775,470,000
Median Income Per Household	68	10,341
Retail Sales Per Household	96	8,107
Total Retail Sales	12	5,797,771,000
Food Store Sales	11	1,300,507,000
Eating and Drinking Place Sales	13	509,204,000

The population and income information presented below provides a demographic view of the Houston, Texas Standard Metropolitan Statistical Area.[16]

Households by Income Group 1971, Houston SMSA

$25,000 - Over	5.1%
15,000 - 24,999	12.4
10,000 - 14,999	24.8
8,000 - 9,999	13.9
5,000 - 7,999	19.0
3,000 - 4,999	14.5

Age of Household Head 1971, Houston SMSA

Under 25 years	9.6%
25 - 34 years	24.0
35 - 44 years	20.8
45 - 54 years	19.1
55 - 64 years	14.4
65 years and over	12.1

Population Projections for 1980

Harris County	Houston SMSA
2,300,000	2,850,000

Houston has a versatile economy, not dependent alone on its shipping or commerce, but also on its large and small industries. Tens of thousands of people are employed in manufacturing oil field equipment, electronic

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15 Sales Management: 1974 Survey of Buying Power, Sales Management Magazine.

16 U.S. Census of Population, 1970.

products, machinery and tools, chemical products, iron and steel, synthetic rubber, paper pulp, building materials, paint, containers, plastic products and clothing. Houston's industries process petroleum, natural gas, cotton seed and livestock, and mill rice and flour.[17]

Planning for the test market started in the spring and summer of 1974. Initial contacts of personnel and retail outlets were made in the fall of 1974. Actual test market operations were undertaken in February of 1975 and continued through April of 1975. A complete description of the test market operation and analysis of the data obtained is presented in the following chapter.

[17] Information supplied by Houston, Texas Chamber of Commerce.

Chapter III

PRESENTATION OF TEST MARKET FINDINGS

Introduction

Chapter III of this report provides a description of the Houston test market operation, presents a summary of the data collected, contains an analysis of those data, and reviews promotional activities conducted during the test market.

Description of the Test Market Activities

The actual execution of the Houston test market project started in October, 1974 and concluded at the end of April, 1975. During this period of time, test outlets were secured, a research assistant hired, promotion conducted, and data collected.

After reviewing test market procedures and social, economic, and geographic data on the city of Houston, the research team was prepared to initiate the test market study.[1] The immediate objectives were to: (1) identify retail outlets that would be suitable to test market firms, and (2) secure research assistance for the project. To accomplish the first objective, contacts were made with four of Houston's largest seafood wholesalers. The wholesalers provided names of food store chains, restaurants, and seafood markets that were the more prominent seafood marketers in Houston.

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[1]The research team conducting the Houston, Texas crawfish test market project included: Dr. James C. Carroll, Dr. Robert S. Franz, Dr. Tom F. Griffin, and Dr. Holland C. Blades, Jr. All team members were from the Marketing Department of the University of Southwestern Louisiana.

In addition, contacts were made at the University of Houston to secure the services of a graduate student in distributive education to serve as a local representative for the project and as a general research assistant.[2]

By early November, 1974, lists had been developed of possible retail participants in the test market project. Also, Tony Chachere[3], of Opelousas, Louisiana, had agreed to aid the test market project by providing information and demonstrations in Houston on the preparation of crawfish dishes. Finally, crawfish processors and dealers in South Louisiana were informed as to the nature of the project and arrangements were made with them to ship crawfish to Houston for the test market study.

From early November, 1974, through mid-January, 1975, the research team was involved in making arrangements with seafood markets, restaurants, and food stores that would participate in the project. By mid-January, 1975, seven restaurants, six seafood markets, six food stores, and one large hotel had agreed to participate in the test market project.

When asking the owner or manager of a seafood market, restaurant, or food store to participate in the test market, all details of the project were carefully explained. It was first stated that the purpose of the study was to explore the possibility of expanding the market for crawfish, with a view to increasing employment within the crawfish industry. It was

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[2]Mrs. Carol Stuart was a graduate student in distributive education and marketing at the University of Houston. In addition, Mrs. Stuart had had previous experience in retailing and purchasing.

[3]Tony Chachere is a well-known South Louisiana cooking expert and the author of Tony Chachere's Cajun Country Cookbook.

further explained that, because of the crawfish's short life out-of-water, the study would primarily be concerned with the sale of chilled or frozen tail meat.[4] The owners and managers were also told that promotion, both in the form of mass media advertising and point-of-purchase material, would be provided during the test market period. In addition, it was stated that Tony Chachere would be available to give cooking demonstrations and distribute recipes on how to prepare crawfish. Finally, information on where to obtain crawfish was also distributed. In return, those firms that agreed to participate in the test market project were asked to provide the researchers with data on the quantities of crawfish sold during the test market period and any other comments they may have to offer that would be relevant to the successful marketing of crawfish.

The first phase of the actual test market sales period began on January 17, 1975, when the Shamrock Hilton Hotel in Houston introduced crawfish during a major seafood day promotion. The test market period for restaurants and seafood markets in Houston started on January 20, 1975, and for food stores on February 17, 1975. The price of crawfish tail meat and live crawfish was relatively high at the start of the test market period and some outlets attempted to delay participation in the project in anticipation of lower prices. Nevertheless, by mid-February, all test market firms were actively involved in selling crawfish. During the months of February, March, and April, 1975, data were collected from those outlets involved in the test market. During the test period, television, radio, and newspaper promotional activities were carried out with the

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[4]Although the study was most concerned with the sale of crawfish tail meat, many owners and managers expressed interest in the sale of live crawfish as well. Consequently, live crawfish were sold during the test market period and data were collected on the quantities sold.

major concentration of promotion conducted in March of 1975. During the actual test market period, researchers made repeated visits to Houston to check on the project's progress, to see to any problems that may have arisen, and to supervise promotional activities.

Summary of Data Collected

During the test market period from late January, 1975 until the end of April, 1975, data were collected on a weekly basis from each outlet in the study. After careful consideration, it was determined that the best measure of marketing success would be the quantity of crawfish purchased by retail firms in the Houston test market group. Because of the relatively short life of crawfish inventories, it was assumed that the quantity of crawfish sold would be approximately equal to the quantity of crawfish purchased. The following data present a summary of the crawfish volume handled by various participating outlets during the Houston test market project.

Restaurants

Houston area restaurants participating in the crawfish test market study included: Bordman's, Brennan's, Chez Orleans (I-45 and Westheimer), Hilliard's, Hyden's, Jimmie Walker's, and Pavillion Room of the Shamrock Hilton Hotel. Other restaurants such as Kaphan's, Fisherman's Wharf, Spanish Galleon, and the Hyatt Regency Hotel and Petroleum Club had originally agreed to participate, but for various reasons were unable to do so. The Hyatt Regency and the Petroleum Club each had "Cajun Nights" as one-time-only social events at the beginning of the test market period. The other restaurant managers expressed an interest in offering crawfish entrees sometime in the future; their reluctance stemmed from the high wholesale price of the tail meat and live crawfish. One restaurant manager felt that commercially prepared etouffee would be the answer for his establishment. Bordman's restaurant used this tactic for ease in kitchen preparation. Brennan's also limited their crawfish offerings to special events during the crawfish test market period.

During the course of the test market study, many restaurants not participating in the study added crawfish entrees to their menus. Among these were: The Gumbo King, Huber's, Massa's, and Charley's 517. The dining rooms of private clubs, such as River Oaks, Lakeside, River Plantation, and Lakeside, as well as the new Glass Menagerie Restaurant at the Woodlands (a new pre-planned community) also offered crawfish on special occasions.

Comments were made by local restaurant managers that the status of crawfish consumption in Houston is now equivalent to that of shrimp twenty years ago, and that crawfish appears to have a tremendous potential for expansion in this market.

Table I on page 24 indicates the quantity of both live crawfish and crawfish tail meat purchased by participating restaurants during the test market period. In addition, Table I illustrates the number of restaurants making purchases each week during this period of time.

<u>Seafood Markets</u>

Houston area seafood markets participating in the test market study included: Airline Fish Market, Catfish Bill's Fish Market, Deepwater Seafoods, Emery's Seafoods, The Fishery, and Glatzmaier's Seafoods.

Total pounds of crawfish purchased by retail seafood markets during the test market period was 25,485 pounds of live crawfish and 2,519 pounds of tail meat.

The only participating seafood wholesaler was the Dutchman's Wholesale Seafoods. This firm purchased a total of 12,361 pounds of live crawfish and 2,953 pounds of tail meat. Most of the subsequent resales were to Houston area restaurants and seafood markets.

TABLE I

CRAWFISH PURCHASED BY HOUSTON TEST MARKET
RESTAURANTS AND HOTELS

Week	Number of Outlets Making Purchases	Pounds of Live Crawfish Purchased	Pounds of Crawfish Tail Meat Purchased
1/13/75	1		100
1/20/75	1		100
1/27/75	2	336	
2/3/75	6	417	454
2/10/75	6	673	236
2/17/75	7	1,138	86
2/24/75	7	1,296	346
3/3/75	7	789	362
3/10/75	8	1,130	320
3/17/75	7	1,567	183
3/24/75	7	1,069	317
3/31/75	7	1,038	70
4/7/75	8	1,624	283
4/14/75	7	1,179	232
4/21/75	7	1,090	262
4/28/75	7	1,239	212
TOTALS		14,585	3,563

Table II illustrates the quantity of live crawfish and crawfish tail meat purchased by seafood markets involved in the study during the test market period. Also, Table II indicates the number of seafood markets purchasing crawfish each week during the test market.

Food Stores

The Rice Food Markets chain has 44 supermarkets in the Houston area. They are located in sections of town that range from the very affluent to very low income areas. At the outset of the test market, five stores (Village, Tanglewood, Stella Link, Piney Point, and Chimney Rock) were included. Each of these stores are in high income areas. Two weeks later the Memorial and Hedwig stores were added. These stores are also in upper class neighborhoods. Then, because of store request, the Blodgett and Homestead stores were added four weeks after the initial start of the test market. These last two grocery stores are in low income areas of Houston.

The only promotional devices used by Rice Food Markets other than those provided by the USL researchers were Doris Kay's "Recipes of the Week". As a consumer advisor for the stores, Doris Kay devoted two of these recipe handouts to crawfish entrees. In an effort to increase sales of the packaged tail meat, the Piney Point store used a trailer sign advertising crawfish at the entrance to the shopping center.

Along with Doris Kay, Tony Chachere made a personal appearance at the Tanglewood store on April 3, 1975, to demonstrate the preparation of etouffee and answer questions about crawfish. Ms. Kay expressed the opinion that crawfish tail meat sales at Rice Food Markets would have been far more successful with more in-store demonstrations.

TABLE II

CRAWFISH PURCHASED BY HOUSTON TEST MARKET SEAFOOD MARKETS

Week	Number of Outlets Making Purchases	Pounds of Live Crawfish Purchased	Pounds of Crawfish Tail Meat Purchased
1/13/75			
1/20/75	1		48
1/27/75	3	437	103
2/3/75	6	1,383	278
2/10/75	6	1,752	85
2/17/75	6	1,791	254
2/24/75	6	1,667	176
3/3/75	6	1,776	172
3/10/75	6	2,198	117
3/17/75	6	2,304	325
3/24/75	6	1,664	220
3/31/75	6	1,397	103
4/7/75	6	1,657	72
4/14/75	6	2,178	203
4/21/75	6	2,252	178
4/28/75	6	3,029	185
TOTALS		25,485	2,519

Total pounds of crawfish tail meat purchased by all nine Rice Food Markets was 439 pounds, with a considerable inventory on hand at the end of the test market period. During the test market, Rice Food Markets did not carry live crawfish. Table III shows the number of Rice Food Markets ordering various quantities of crawfish tail meat each week during the test market.

The total quantities of crawfish products purchased by food stores, restaurants, and retail seafood markets during the Houston test market period is presented in Table IV.

Based on the aggregate data presented in Tables I, II, III, and IV, it is evident that restaurants and seafood markets were the two major marketing outlets in the Houston test market. Restaurants and hotels accounted for 36 per cent of the total purchases of live crawfish during the test market period with 64 per cent of the live crawfish being purchased by seafood markets. No live crawfish were sold through food stores. Only crawfish tail meat was sold through the food stores.

The percentage division for the purchase of crawfish tail meat by Houston test market outlets was as follows: 38 per cent for seafood markets, 55 per cent for restaurants, and 7 per cent for food stores. A total of 40,070 pounds of live crawfish and 6,521 pounds of tail meat was purchased by the outlets participating in the test market. Approximately 40,756 pounds of live crawfish would be required to produce the 6,521 pounds of tail meat that was purchased by the outlets participating in the test market. Therefore, during the Houston test market period, an equivalent of approximately 80,826 pounds of live crawfish were sold to the participating test outlets.

TABLE III

CRAWFISH PURCHASED BY HOUSTON
TEST MARKET FOOD STORES

Week	Number of Rice Food Stores Making Purchases	Pounds of Crawfish Tail Meat Purchased by Rice Chain
2/17/75*	5	40
2/24/75	5	40
3/3/75	7	50
3 10/75	7	50
3/17/75	9	71
3/24/75	9	69
3/31/75	9	38
4/7/75	9	22
4/14/75	9	21
4/21/75	3	20
4/28/75	3	18
TOTAL		439

*Food stores delayed purchases in anticipation of lower prices.

TABLE IV

CRAWFISH PURCHASED BY ALL HOUSTON TEST MARKET OUTLETS

Week	Number of Outlets Making Purchases	Pounds of Live Crawfish Purchased	Pounds of Crawfish Tail Meat Purchased
1/13/75	1		100
1/20/75	2		148
1/27/75	5	773	103
2/3/75	13	1,800	732
2/10/75	12	2,425	321
2/17/75	18	2,929	380
2/24/75	18	2,963	562
3/3/75	20	2,565	584
3/10/75	22	3,328	487
3/17/75	22	3,871	579
3/24/75	22	2,733	606
3/31/75	22	2,435	211
4/7/75	22	3,281	377
4/14/75	22	3,357	456
4/21/75	16	3,342	460
4/28/75	16	4,268	415
TOTALS		40,070	6,521

Analysis of Data Collected

The sales data collected from the firms participating in the Houston test market were analyzed to determine: (1) the relative performance of various types of retail outlets for crawfish, (2) the relative performance of live crawfish and peeled tail meat in the various types of retail outlets, (3) the degree to which actual sales in the test market achieved sales objectives, and (4) the total potential sales of crawfish in the state of Texas if crawfish were made available in every Texas SMSA.

Comparison of Retail Outlets

The first analysis of data from the test market project was undertaken to determine the average rate of crawfish sales for various types of retail outlets participating in the study. Due to the weight loss in processing live crawfish into peeled tail meat, it can be confusing to compare sales in pounds of live crawfish to sales in pounds of peeled tail meat. One pound of peeled tail meat will usually yield approximately four restaurant servings of crawfish entree, and one restaurant serving of boiled crawfish contains roughly two pounds of live crawfish. Therefore, in order to facilitate comparisons between sales of live crawfish and peeled tail meat, the sales in pounds contained in Tables I, II and III were converted to numbers of servings. Each quarter pound of crawfish was counted as one serving.

Table V, Page 321, contains the approximate number of servings of live crawfish peeled tail meat purchased form each type of retail outlet during the test market period.

Inspection of the total servings of crawfish in Table V reveals that crawfish sales were low at the beginning of the test. Low initial sales occur frequently when products are introduced into new markets. By February 24, however, sales reached a level which was sustained until the end of the test market period. The average number of servings per week from February 24 to April 28 was 3,502.

TABLE V

CRAWFISH SERVINGS BY TYPE OF OUTLET, PRODUCT, AND WEEK

Week Beginning:	Restaurants		Seafood Markets		Food Stores	Total Servings
	Tail Meat Servings	Live Servings	Tail Meat Servings	Live Servings	Tail Meat Servings	
January 13	400	0	0	0	0	400
January 20	400	0	192	0	0	592
January 27	0	168	412	218	0	798
February 3	1816	208	1112	691	0	3827
February 10	944	336	340	876	0	2496
February 17	344	569	1016	895	160	2984
February 24	1384	648	704	833	160	3729
March 3	1448	394	688	888	200	3618
March 10	1280	565	468	1099	200	3612
March 17	732	783	1300	1152	284	4251
March 24	1268	534	880	832	276	3790
March 31	280	519	412	698	152	2061
April 7	1132	812	288	828	88	3148
April 14	928	589	812	1089	84	3502
April 21	1048	545	712	1126	80	3511
April 28	848	619	740	1514	72	3793
Product Totals	14,252	7,289	10,076	12,739	1756	
Outlet Totals	21,541		22,815		1756	
Grand Total						46,112

During the period from February 24 to April 28, restaurants averaged 1636 servings per week, or 224 servings per outlet per week. Seafood markets averaged 1706 servings per week or 284 servings per outlet per week. Food stores averaged 160 servings per week or 23 servings per outlet per week. Thus, both seafood markets and restaurants achieved satisfactory levels of sales. However, food store sales levels were not satisfactory.

Comparison of Crawfish Products

The second phase of the analysis of the data evaluated the relative performance of crawfish tail meat and live crawfish in restaurants and seafood markets. Food stores were not included in this analysis because they did not sell live crawfish. The two measures of product performance used in this analysis were sales volume and unit contribution margin. Sales volume measures the average number of servings per week achieved by the average seafood market and restaurant. Unit contribution margin measures the difference between the restaurant or seafood market's selling price for a serving of crawfish and the outlet's cost of crawfish per serving.

The typical restaurant in the study averaged preparing 66% of its servings from peeled tail meat and 34% from live crawfish. This amounts to 148 servings prepared from tail meat per week and 76 servings per week prepared from live crawfish. Thus, restaurants achieved higher sales volume with entrees prepared from peeled tail meat than with entrees prepared from live crawfish.

Seafood markets averaged selling 56% of their servings in the form of live crawfish and 44% in the form of peeled tail meat. This represents an average of 169 servings of live crawfish and 115 servings of tail meat per week for the average seafood market. Thus, seafood markets achieved a higher sales volume with live crawfish than with tail meat.

The typical restaurant charged $4.00 per serving for crawfish entrees prepared from peeled tail meat. At a price of $3.60 per pound for tail meat, the cost per serving was $0.90 and the unit contribution margin was $3.10 per serving. Boiled crawfish were typically sold for $3.50 per serving by the restaurants. The cost to the restaurants was $1.05 per serving based on prices of $0.50 to $0.55 per pound for live crawfish. This yields a contribution margin of only $2.45 per serving. Thus, restaurants achieved higher volume and higher contribution margin from peeled tail meat than from live crawfish.

The typical seafood market in the study sold live crawfish for $1.44 per serving based on a price of $0.72 per pound. The cost per serving was $1.05 leaving a contribution margin of $0.39 per serving for live crawfish. Seafood markets sold peeled tail meat for $1.12 per serving based on a price of $4.50 per pound. With a cost of $0.90 per serving, the peeled tail meat yielded a contribution margin of $0.22 per serving. Seafood markets, in contrast to restaurants, enjoyed their greatest success in terms of both volume and contribution margin with live crawfish rather than peeled tail meat.

Evaluation of Test Market Sales

The comparison of actual test market sales to predicted test market sales is an important part of the process of evaluating customer acceptance of crawfish. Appendix III contains the procedure used to estimate the predicted crawfish levels sales during the test market. Table III summarizes the actual and predicted numbers of servings per week for restaurant and home consumption. Actual home consumption is the total of seafood market and food store purchases.

TABLE VI

ACTUAL AND PREDICTED SALES LEVELS
FOR CRAWFISH
(Servings Per Week)

	Restaurant Consumption	Home Consumption
Actual	1635	1729
Predicted	1190	1980

Predicted sales for restaurants were 1190 servings per week. However, restaurants actually sold at 1635 servings per week, 37 percent more than predicted. Predicted sales for home consumption (i.e., sales by both seafood markets and food stores) was 1980 servings per week. Actual sales for home consumption were 1729 servings per week, 12 percent below predicted sales.

Several factors can be cited which may have contributed to the higher than anticipated sales levels obtained by restaurants during the test market. First the predicted sales levels of crawfish were based upon Houston population demographics and did not make allowances for sales to the national and international clienteles of some restaurants in the test market. Possibly the most important influence on sales was the high degree of cooperation received from the Houston media which led to a high level of product exposure during the test market. An attempt to assess the impact of this exposure is included in the section of this chapter devoted to media coverage.

That home consumption was slightly less than predicted may be due to the fact that people, unfamiliar with crawfish, may try them first in restaurants before preparing them at home. Thus, seafood market sales would be expected to lag behind restaruant sales. It should be noted that the seafood market sales of crawfish did tend to remain on a slightly increasing path even at the end of the test market.

Estimates of Crawfish Sales

Based on the results of the test market in Houston it is possible to make estimates of the total sales potential for the Houston SMSA and the total sales potentials for other SMSA's in the state of Texas. The discussion of the Houston estimates which follows also illustrates the procedure used to make estimates for other Texas SMSA's.

U.S.L. researchers estimate that Houston has roughly 96 restaurants that would be classified as "better" seafood restaurants. If under conditions of maximum marketing effort five out of six of these establishments elected to carry crawfish, and if they sold an average of 224 servings per week, a total of 17,920 servings per week would be realized.[5] The cost of crawfish purchased by the outlets would be $17,041 per week assuming test market prices and that 66 percent of the servings were from peeled tails and the remaining from live crawfish. If five out of six of the 58 seafood markets in Houston sold an average 284 servings they would sell a total of 13,727 servings per week. The cost of crawfish purchased would be approximately $13,507 assuming test market prices and that 56 percent of the servings were prepared from live crawfish and the remaining servings from peeled tails. Thus, a conservative estimate of potential sales of crawfish is $30,548 per week in Houston. This would represent 4340 pounds of tail meat and

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[5]This estimate based on the judgement of the researchers who have observed this proportion in mature crawfish markets.

28,384 pounds of live crawfish per week. Over a sixteen week season $488,768 in sales would be realized from the sale of 69,440 pounds of tail meat and 454,144 pounds of live crawfish.

The following tables estimate sales potential in Texas SMSA's using the same procedure outlined above for Houston. The method of estimating the potential number of outlets in each SMSA is outlined in Appendix IV. Note that these sales estimates reflect the attainable first year sales from an aggressive marketing efforts. Subsequent years would likely produce higher sales levels. Eventually sales would be large enough to require distribution through food stores at profitable volumes for the stores.

TABLE VII

SALES POTENTIALS FOR CRAWFISH IN
TEXAS SMSA'S

SMSA	Estimated Number of Restaurants Participating	Estimated Number of Seafood Markets Participating	Sales Potential ($/wk)	Sales for 16 Weeks ($)
Abilene	1	1	494	7,904
Amarillo	2	1	707	11,312
Austin	6	4	2,404	38,464
Beaumont	11	6	4,031	64,496
Brownsville	2	1	707	11,312
Bryan	1	0	213	3,408
Corpus Christi	7	4	2,617	41,872
Dallas	38	23	14,566	233,056
El Paso	4	2	1,415	22,640
Fort Worth	16	9	5,941	95,056
Galveston	6	4	2,404	38,464
Houston	80	48	30,548	488,768
Laredo	1	0	213	3,408
Lubbock	2	1	707	11,312
McAllen	1	1	494	7,904
Midland	2	1	707	11,312
Odessa	2	1	707	11,312
San Angelo	1	0	213	3,408
San Antonio	12	7	4,526	72,416
Sherman	1	1	494	7,904
Tex-Arkana	1	1	494	7,904
Tyler	2	1	707	11,312
Waco	2	1	707	11,312
Wichita Falls	2	1	707	11,312
TOTALS	203	119	76,723	1,227,568

TABLE VIII

SALES POTENTIALS FOR TEXAS SMSA'S
BY WEIGHT OF CRAWFISH

SMSA	Per Week Tail Meat (lbs.)	Per Week Live (lbs.)	Per 16-Week Season Tail Meat (lbs.)	Per 16-Week Season Live (lbs.)
Abilene	68.75	490	1,100	7,840
Amarillo	102.75	642	1,644	10,272
Austin	337.00	2,264	5,392	36,224
Beaumont	579.50	3,700	9,272	59,200
Brownsville	102.75	642	1,644	10,272
Bryan	37.00	152	592	2,432
Corpus Christi	374.00	2,416	5,984	38,656
Dallas	2,067.25	13,550	33,076	216,800
El Paso	205.50	1,284	3,288	20,544
Fort Worth	850.75	5,474	13,612	87,584
Galveston	337.00	2,264	5,392	36,224
Houston	4,340.00	28,384	69,440	454,144
Laredo	37.00	152	592	2,432
Lubbock	102.75	642	1,644	10,272
McAllen	68.75	490	1,100	7,840
Midland	102.75	642	1,644	10,272
Odessa	102.75	642	1,644	10,272
San Angelo	37.00	152	592	2,432
San Antonio	645.25	4,190	10,324	67,040
Sherman	68.75	490	1,100	7,840
Tex-Arkana	68.75	490	1,100	7,840
Tyler	102.75	642	1,644	10,272
Waco	102.75	642	1,644	10,272
Wichita Falls	102.75	642	1,644	10,272
TOTALS	10,932.25	71,078	175,108	1,137,248

Media Coverage of Crawfish Test Market Activities in Houston, Texas

On December 17, 1974, the Houston Post ran an article with the headline, "Cajuns Comin Crawfish Callin," heralding the approach of the University of Southwestern Louisiana's crawfish test market study to determine the saleability of crawfish tail meat in the Houston area. This was but the first of many articles and appearances in the media to inform the public of the availability of crawfish tail meat in Houston and where it might be obtained.

In January, 1975, a press release was sent to appropriate editors of the major newspapers (foods, dining out, and society) and entertainment type magazines in Houston. Press releases were also sent to six television stations and fifteen radio stations outlining the purposes of the project and giving any needed information. Most of the press releases were followed up by personal contacts, either in person or by telephone.

Table X summarizes the media coverage, both publicity and paid advertisements, of the University of Southwestern Louisiana's crawfish test market project. This does not include any paid advertising by individual outlets.

TABLE IX

OUTLINE OF MEDIA COVERAGE

Newspapers:	Total Number of Appearances:
USL paid ads	9
Public relations: (Feature articles)	9
Public relations: (Mention only)	19
Note: Coverage was given by the foods, dining-out, and society editors for the two major Houston newspapers.	
Magazines:	
Texas Monthly	1 month/significant mention
Radio:	
USL paid spots	60
Guest spots	2
(Also some undocumented coverage)	
Television:	
Guest appearances	5
Personal Appearances:	
Cooking Demonstrations, Speeches, etc.	6
Total Number of Media Exposures (not including magazines)	110

News media which were used during the Houston Crawfish test market included the following firms:

Newspapers and Magazines:

Houston Post
Houston Chronicle
Houston Business Journal
Houston Restaurant Magazine
The Houston Scene
Houston Key
Spectator

Television Stations:

KHOU-TV	Channel 11
KPRC-TV	Channel 2
KTRK-TV	Channel 13
KVRL-TV	Channel 26
KHTV-TV	Channel 39
KUHT-TV	Channel 8

Radio Stations:

KPRC	KLEF
KULF	KXYZ
KYND	KENR
KTRH	KIKK
KLYX	KNUZ
KLOL	KODA
KILT	KQUE
KRBE	

The following discussion contains further details concerning the publicity through all media and paid advertising during the Houston Crawfish test market project.

Newspapers

Advertising paid for by the test market project appeared in the Houston Post newspaper from the week of February 17, 1975 through the week of March 17, 1975. A total of nine ads were run. Five of these were for the seafood markets and food stores, and appeared in the food section of the Thursday editions. The other four advertisements were for restaurants and appeared on the Friday dining out page. Copies of the ads appearing in the Houston Post are illustrated in Appendix III of this report.

Radio

Radio spot announcements were purchased from KPRC Radio Station by the research group to run for five weeks, from February 20 through the week of March 17, 1975. These were aired on Thursday, Friday, Saturday, and Sunday.

Twelve radio spots were run per week and were equally divided between restaurants and seafood market/food stores. The scheduling of the commercials coincided with the greatest expected audiences for the type of outlet; that is, whether they would be more interested in dining out or buying crawfish to cook at home. As outlets were added to the test market study, they were included in the radio spots. The original script submitted by the research group to station KPRC is included in Appendix II.

Television

Television coverage during the test market period included personal interviews, guest appearances, and cooking demonstrations on Houston's major television channels. The following list summarizes television coverage during the test market period.

KTRK-TV Channel 13

Dialing for Dollars: Monday, February 10, 1975
Tony Chachere demonstrated crawfish cookery.

6 O'clock News: March 14, 1975
David Glodt, News Reporter for KTRK interviewed Dr. James Carroll, project director, at The Fishery and at Bordman's Restaurant.

KVRL-TV Channel 26

The Dick Gottlieb Show: Thursday, February 13, 1975
Tony Chachere was interviewed by Dick Gottlieb and demonstrated crawfish cookery.

KPRC-TV Channel 2

The Joanne King Show: Wednesday, February 26, 1975
Dr. James Carroll and Tony Chachere were interviewed by Joanne King on the topic of crawfish. Dr. Carroll discussed a slide presentation about crawfish production and Tony Chachere discussed the preparation of crawfish.

KHTV-TV Channel 39

The Marijane Vandiver Show/Calendar: Wednesday, March 5, 1975
Tony Chachere demonstrated crawfish cookery and discussed the test market study.

KHOU-TV Channel 11

> Mr. Tony Chachere was scheduled to appear on the Doug Brown Morning Show, but the station found it necessary to postpone his appearance. However, it may still be arranged at a future date.

According to the outlets participating in the study, advertising did help in obtaining more business, and in stimulating a demand for crawfish products. Therefore, Table X is included as an illustration of the relationship between media coverage and sales of crawfish on a week by week basis during the test market study.

TABLE X

CRAWFISH TEST MARKET: PUBLICITY, PUBLIC RELATIONS AND U.S.L. PAID ADVERTISING --COMBINED WITH SALES IN POUND FIGURES BY WEEK (OUTLET PAID ADS NOT INCLUDED)

	FOR THE WEEK OF	1/13	1/20	1/27	2/3	2/10	2/17	2/24	3/3	3/10	3/17	3/24	3/31	4/7	4/14	4/21	4/28
NEWSPAPERS	PAID ADVERTISING (U.S.L.)						2	2	2	1	2						
	PUBLIC RELATIONS--FEATURE			1	1	1		1									
	PUBLIC RELATIONS--MENTION	1		5	1	2		1	1				1	1	2		
MAGAZINE (NOT INCLUDED IN TOTAL)																	
RADIO	PAID--U.S.L. "SPOTS"						12	12	12	12	12						
	FREE	2															
PERSONAL APPEARANCES				2		1							1		1		1
TELEVISION FREE						2		1	1	1							
TOTAL NUMBER OF EXPOSURES		1	2	8	2	6	14	17	16	14	14	0	2	1	3	0	1
SALES	TOTAL LIVE CRAWFISH	---	---	1150	2099	3296	5233	3982	3048	3669	4840	3566	3238	4477	4396	4320	5117
	TOTAL TAILMEAT	100	148	103	744	321	493	622	609	496	617	633	211	377	476	460	445

A plot of crawfish servings and the total exposures for each week of the test market, Figure 1, reveals that peaks in sales generally follow peaks in exposures by one to three weeks. Troughs in sales consistently followed troughs in exposures by one week.

Increases in sales were always greater than corresponding increases in exposures, but decreases in sales were not as great as the corresponding decrease in exposures. To put it simply, increases in exposures resulted in larger increases in sales, and the new sales levels could be sustained with relatively small numbers of exposures.

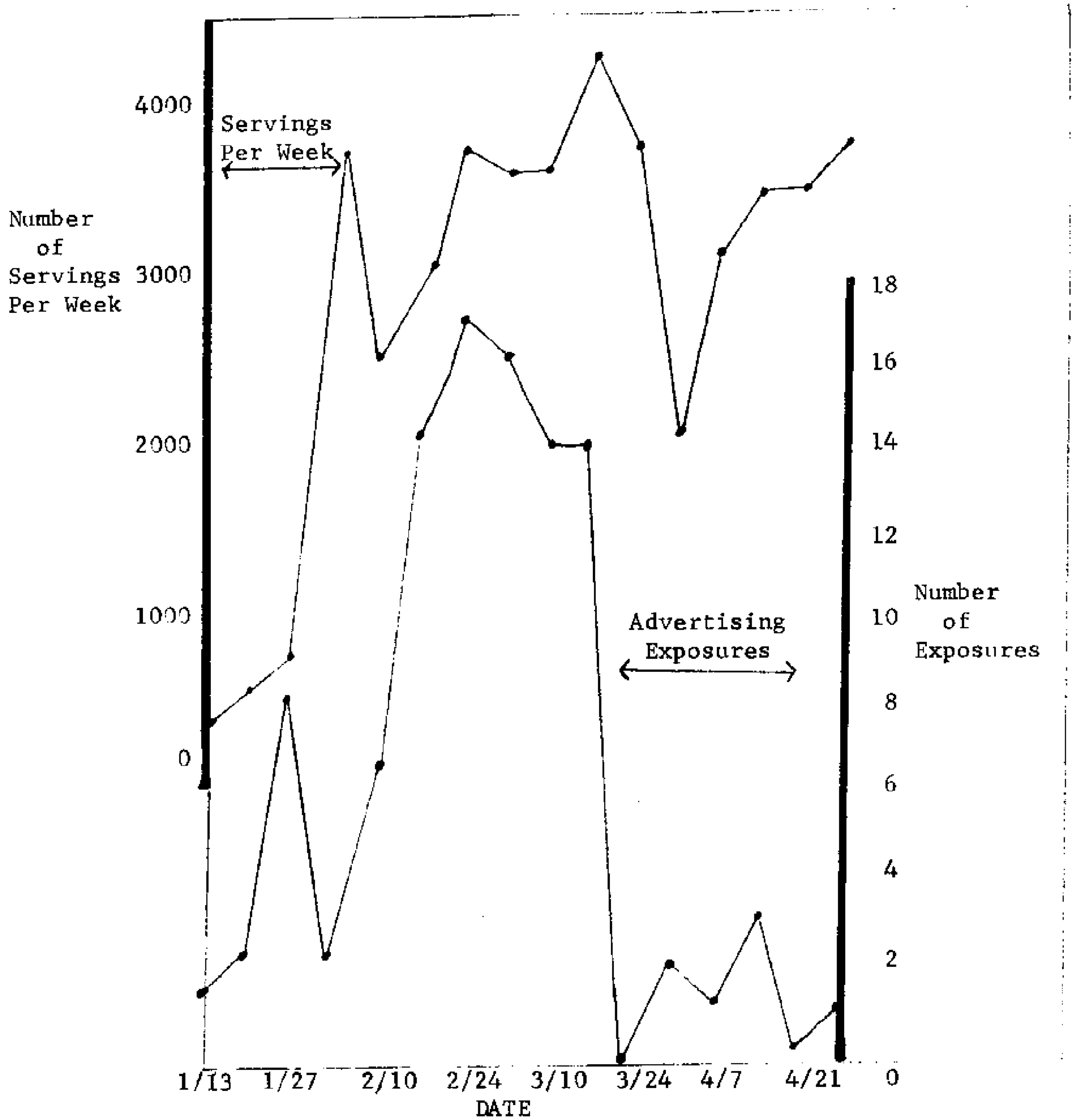


Fig. 1.-- Plot of weekly advertising exposures (lower line read from right scale) and servings per week (upper line read from left scale).

Point-of-Purchase Promotional Material

In addition to mass media promotional efforts, point-of-purchase promotional materials were provided to participating test market outlets. These materials included 17" x 22" posters, 3" x 5" table tents, 3" x 5" recipe cards, and menu clip-on cards. The posters were made available to all participating outlets while recipe cards were primarily distributed to seafood markets and food stores. Table tents and menu clip-on cards were used mainly by restaurants and hotels. The basic theme of the point-of-purchase material was: Crawfish from Louisiana Now Available for Your Dining Enjoyment. Examples of the point-of-purchase materials used in the test market are displayed in Appendix II.

Comments Regarding the Effectiveness of Promotional Efforts

It is always difficult to judge the effectiveness of any promotional effort. Nevertheless, in the opinion of the managers of most participating outlets, the promotion of crawfish during the test market period did add to their sales volume. The following are representative comments received from various outlet managers regarding the promotional efforts.

According to Mr. Granny Harbor, owner of the two Chez Orleans Restaurants, "test market publicity by USL researchers added considerably to our business." Mr. Frank Piazza of Glatzmaier's Seafood, felt the interest generated by the test market was definitely an asset to their crawfish business. Mr. O. E. Hilliard, of Hilliard's Restaurant in Crosby, Texas, stated that USL test market advertisements and free publicity increased their business from Houston customers. Mr. Bill Russell, of Catfish Bill's Fish Market, stated that he felt the demand was generated too far ahead of the supply and that it might have been better to start the project later than the beginning of February for better results. As has been stated, comments were received that the consumption of crawfish in Houston is now the equivalent of shrimp twenty years ago and that crawfish has tremendous potential for expansion in the Houston market area.

Conclusion

Chapter III has presented a description of the Houston crawfish test market activities, summarized the data collected, and reviewed the media coverage of the test market project. In all, 24 outlets participated in the test market during the months of January, February, March, and April of 1975. During this period a total equivalent to approximately 80,870 pounds of live crawfish was purchased by the participating restaurants, seafood markets, and grocery stores. In addition, a variety of mass media and in-house publicity was employed to inform the Houston public as to the availability of crawfish. In the most general sense, it can be concluded that a substantial market for crawfish does now exist in Houston, Texas and that market demand should be expected to grow in the future.

Chapter IV

SUMMARY, CONCLUSIONS, RECOMMENDATIONS

Summary

The Louisiana crawfish industry continues to be a local operation. Many people now dealing in crawfish tend to think of their market as being located almost exclusively in South Louisiana. Yet, many individuals now believe that continued development of the crawfish industry will depend upon modern marketing techniques in these ventures.

The test market period for restaurants and seafood markets in Houston began on January 20, 1975, and for food stores on February 17, 1975. By mid-February all test market firms were actively involved in selling crawfish. During months of February, March, and April, 1975, data were collected from those outlets involved in the test market. During the test period, television, radio, and newspaper promotional activities were carried out with the major concentration of promotion conducted in March of 1975. An analysis of the data obtained and the writing of the final report was done during the summer and fall of 1975.

Conclusions

The general purpose of the crawfish test market in Houston centered on the question of whether or not crawfish could be successfully marketed in a major city outside of Louisiana. It was not known what problems would be encountered when attempting to convince marketing institutions to handle crawfish products for the first time. No information existed as to the quantities of crawfish that could be sold through each type of marketing institution. Finally, it was not known what types of crawfish products would prove to be most popular with non-Louisiana consumers. Information obtained by this study helped to answer these questions. Listed below are the major conclusions of the study:

1. It can be concluded that large quantities of crawfish can be sold in the Houston, Texas market area. The 24 participating outlets sold a total of 40,070 pounds of live crawfish and 6,521 pounds of crawfish tail meat during the test market period. In addition, other outlets that were not included in the test market program were known to have sold crawfish.

2. Both live crawfish and crawfish tail meat proved to be popular among Houston outlets. Live crawfish proved to be more popular with seafood markets which sold 25,485 pounds of live crawfish and 2,519 pounds of crawfish tail meat. Restaurants appeared to have a greater preference for tail meat as they purchased 3,563 pounds of tail meat and 14,585 pounds of live crawfish.

3. In terms of the importance of various types of outlets, it can be concluded that: (1) for live crawfish, seafood markets are the most important outlets followed by restaurants. (2) for tail meat, restaurants are the most important outlets, the next most important outlets are seafood markets, and the least important type of outlet are food stores.

4. Unfortunately the research group was unable to obtain extensive data regarding the most popular crawfish dishes sold in restaurants or the most popular crawfish products sold in seafood markets. However, informal discussions with the managers of participating outlets did provide some information on this subject. Based on these discussions it may be concluded that crawfish etouffee was the most popular restaurant dish, followed by boiled crawfish. Live crawfish for home cooking was the most popular crawfish product sold in seafood markets. (Recipes for crawfish etouffee, crawfish pie, and crawfish stuffed bell pepper were distributed through seafood markets and food stores. These dishes require the use of peeled tail meat.)

5. No direct customer reactions to crawfish were obtained during the test market. However, it was the opinion of most restaurant managers that Houston customers were very enthusiastic about the crawfish dishes they tried.

6. It was found to be relatively easy to persuade managers and owners of retail outlets to sell crawfish products for the first time. Approximately 80 percent of the firms asked to participate in the crawfish project eventually did so.

7. Promotional devices such as television appearances, newspaper and radio advertisements, and point-of-purchase materials appear to have been effective in increasing sales and encouraging firms to add crawfish to their product offering.

8. Based on the finding of the test market results, it can be concluded that a large potential market exists in Houston for crawfish products. The total size of the market for crawfish in Houston and other major Texas cities is presented in Appendix III of this report.

Recommendations

The Houston test market project revealed that a large market for crawfish does exist outside of South Louisiana. However, little will be accomplished if efforts are made to increase the demand for crawfish but supplies prove inadequate to meet demand. If the industry is to continue to grow, attempts must be made to improve the supply of crawfish. Consequently, continued efforts should be made to increase the production of crawfish in ponds and in the Atchafalaya Basin. In addition, studies are needed to improve the mechanization of peeling and packaging operations. Finally, improvements are needed in transportation and storage methods so as to provide customers with products that are both desirable and safe.

There are still many unsolved scientific and technological problems associated with the crawfish industry. Yet, some problems have been solved, and others are now yielding to the efforts of continuing research. Nevertheless, the future of the crawfish industry depends upon developing demand as well as supply. Consequently, additional attention must continue to be focused on the opportunities and problems associated with crawfish marketing.

A major question is that of how out-of-state markets for crawfish can be expanded. The logical answer is, of course, to identify and analyze those markets that would appear to be most receptive to the entrance of crawfish products. Again, this points to a need for understanding consumers and buying habits in areas outside of South Louisiana. In addition, data must be obtained regarding wholesale and retail selling institutions in more distant markets.

It would appear that experienced marketing research assistance would be of value, if markets are to be expanded outside the South Louisiana area. Studies such as the Houston test market project which help to identify and answer many of the questions associated with developing new markets should be continued.

APPENDIX I

DATA COLLECTION FORMS

DATA COLLECTION FORM

(For Restaurants)

OUTLET: ____________________

PHONE NO: ____________________

CONTACT: ____________________

DATE	POUNDS SOLD		DID YOU SELL OUT?		LAST PRICE PAID FOR:		PRICE AND PREFERENCE RANK OF CRAWFISH ENTREES (1=Best Selling)	PROMOTIONAL AIDS USED (CHECK)
	LIVE	TAILS	LIVE	TAILS	LIVE	TAILS	PRICES RANKS	
/ /75	___lbs.	___lbs.	___Yes ___No	___Yes ___No	$.___	$.___	$.___Etouffee ___ $.___Bisque ___ $.___Gumbo ___ $.___Fried Tails ___ $.___Boiled ___ $.___ ___	___ Clip-Ons ___ Tents ___ Signs ___ Advertising (Describe Ad) ___
/ '75	___lbs.	___lbs.	___Yes ___No	___Yes ___No	$.___	$.___	$.___Etouffee ___ $.___Bisque ___ $.___Gumbo ___ $.___Fried Tails ___ $.___Boiled ___ $.___ ___	___ Clip-Ons ___ Tents ___ Signs ___ Advertising (Describe Ad) ___
/ /75	___lbs.	___lbs.	___Yes ___No	___Yes ___No	$.___	$.___	$.___Etouffee ___ $.___Bisque ___ $.___Gumbo ___ $.___Fried Tails ___ $.___Boiled ___ $.___ ___	___ Clip-Ons ___ Tents ___ Signs ___ Advertising (Describe Ad) ___
/ /75	___lbs.	___lbs.	___Yes ___No	___Yes ___No	$.___	$.___	$___Etouffee ___ $___Bisque ___ $___Gumbo ___ $___Fried Tails ___ $___Boiled ___ $___ ___	___ Clip-Ons ___ Tents ___ Signs ___ Advertising (Describe Ad) ___

OUTLET: ____________________

PHONE NO: ____________________

CONTACT: ____________________

DATA COLLECTION FORM

(For Seafood Markets)

DATE	POUNDS SOLD		DID YOU SELL OUT?		LAST PRICE PAID FOR:		PRICES CHARGED For ($/lb.)	PROMOTIONAL AIDS USED (CHECK)
	LIVE	TAILS	LIVE	TAILS	LIVE	TAILS		
/ /75	___lbs.	___lbs.	___Yes ___No	___Yes ___No	$__.__	$__.__	Tail Meat $__.__ Live $__.__	Recipe ___Cards ___Signs ___Advertising (Describe Ad) ________
/ /75	___lbs.	___lbs.	___Yes ___No	___Yes ___No	$__.__	$__.__	Tail Meat $__.__ Live $__.__	Recipe ___Cards ___Signs ___Advertising (Describe Ad) ________
/ /75	___lbs.	___lbs.	___Yes ___No	___Yes ___No	$__.__	$__.__	Tail Meat $__.__ Live $__.__	Recipe ___Cards ___Signs ___Advertising (Describe Ad) ________
/ /75	___lbs.	___lbs.	___Yes ___No	___Yes ___No	$__.__	$__.__	Tail Meat $__.__ Live $__.__	Recipe ___Cards ___Signs ___Advertising (Describe Ad) ________

APPENDIX II

PROMOTIONAL MATERIAL USED IN SUPPORT OF THE TEST MARKET PROJECT

CRAWFISH

Now Available for
Your Enjoyment

RESTAURANTS - Ads paid for by USL. (No ad on 3/14 due to unavailable space where requested.)

CRAWFISH

For your dining pleasure. Now in Houston

Crawfish Entrees

Prepared in the best cajun tradition are available at these restaurants

Chez Orleans — Shamrock Hilton Hotel
Jimmy Walkers — Kemah
Hilliards — Crosby
Hyden's — IH 45

Watch this ad each week for other dining places. [illegible] of these delicious, much sought after [illegible]. Recipes for preparing crawfish dishes Cajun style are free at the above places.

THE HOUSTON POST
FRIDAY, FEBRUARY 21, 1975

CRAWFISH

For your dining pleasure. Now in Houston

Crawfish Entrees

Prepared in the best cajun tradition are available at these restaurants

Chez Orleans — Shamrock Hilton Hotel
Jimmy Walkers — Kemah
Hilliards — Crosby
Hyden's — IH 45

BRENNAN'S RESTAURANT

[illegible] Recipes for preparing crawfish dishes Cajun style are free at the above places.

THE HOUSTON POST
FRIDAY, FEBRUARY 28, 1975

CRAWFISH

For your dining pleasure. Now in Houston

Crawfish Entrees

Prepared in the best cajun tradition are available at these restaurants

Chez Orleans — Shamrock Hilton Hotel
Jimmy Walkers — Kemah
Hilliards — Crosby
Hyden's — IH 45

[illegible] of these delicious, much sought after [illegible]. Recipes for preparing crawfish dishes Cajun style are free at the above places.

CRAWFISH

For your dining pleasure. Now in Houston

Crawfish Entrees

Prepared in the best cajun tradition are available at these restaurants

Chez Orleans — Shamrock Hilton Hotel
Jimmy Walkers — Kemah
Hilliards — Crosby
Hyden's — IH 45
Brennan's Restaurant
Bordman's Restaurant

WATCH THIS AD EACH WEEK FOR OTHER DINING PLACES

THE HOUSTON POST
FRIDAY, MARCH 7, 1975

CRAWFISH

For your dining pleasure. Now in Houston

Crawfish Entrees

Prepared in the best cajun tradition are available at these restaurants

Chez Orleans — Shamrock Hilton Hotel
Jimmy Walkers — Kemah
Hilliards — Crosby
Hyden's — IH 45
Brennan's Restaurant
Bordman's Restaurant

WATCH THIS AD EACH WEEK FOR OTHER DINING PLACES

THE HOUSTON POST
FRIDAY, MARCH 21, 1975

CRAWFISH

Now Available for
Your Enjoyment

SEAFOOD MARKETS AND FOOD
STORES -- Ads paid for
by U.S. D

THE HOUSTON POST
THURSDAY, FEBRUARY 20, 1975

CRAWFISH
TAILMEAT CAN NOW BE PURCHASED
FRESH, CLEANED, QUICK FROZEN OR CHILLED
NOW
AVAILABLE IN HOUSTON AT THE FOLLOWING PLACES
Glatzmaier Seafood Market
Bill's Fish Market
Deepwater Seafood
Emery's Seafood — Seabrook
Rice Food Markets No. 1-2-3-12-13
The Dutchman's Seafood-Wholesale
WATCH THIS AD EACH WEEK FOR OTHER LOCATIONS.
PICK UP SUPPLY OF THESE DELICIOUS MUCH SOUGHT AFTER LOUISIANA DELICACIES. RECIPES FOR PREPARING CRAWFISH DISHES CAJUN STYLE ARE FREE AT ATHE ABOVE PLACES.

CRAWFISH
TAILMEAT CAN NOW BE PURCHASED
FRESH, CLEANED, QUICK FROZEN OR CHILLED
NOW
AVAILABLE IN HOUSTON AT THE FOLLOWING PLACES
Glatzmaier Seafood Market
Bill's Fish Market
Deepwater Seafood
Emery's Seafood — Seabrook
Rice Food Markets No. 1-2-3-12-13
The Dutchman's Seafood-Wholesale
WATCH THIS AD EACH WEEK FOR OTHER LOCATIONS
PICK UP SUPPLY OF THESE DELICIOUS MUCH SOUGHT AFTER LOUISIANA DELICACIES. RECIPES FOR PREPARING CRAWFISH DISHES CAJUN STYLE ARE FREE AT ATHE ABOVE PLACES

THE HOUSTON POST
THURSDAY, FEBRUARY 27, 1975

CRAWFISH
TAILMEAT CAN NOW BE PURCHASED
FRESH, CLEANED, QUICK FROZEN OR CHILLED
NOW
AVAILABLE IN HOUSTON AT THE FOLLOWING PLACES
Glatzmaier Seafood Market
Bill's Fish Market
Deepwater Seafood
Emery's Seafood — Seabrook
Rice Food Markets No. 1-2-3-12-13-20-29
The Dutchman's Seafood-Wholesale
WATCH THIS AD EACH WEEK FOR OTHER LOCATIONS.
PICK UP SUPPLY OF THESE DELICIOUS MUCH SOUGHT AFTER LOUISIANA DELICACIES. RECIPES FOR PREPARING CRAWFISH DISHES CAJUN STYLE ARE FREE AT ATHE ABOVE PLACES

THE HOUSTON POST
THURSDAY, MARCH 6, 1975

CRAWFISH
TAILMEAT CAN NOW BE PURCHASED
FRESH, CLEANED, QUICK FROZEN OR CHILLED
NOW
AVAILABLE IN HOUSTON AT THE FOLLOWING PLACES
Glatzmaier Seafood Market
Bill's Fish Market
Deepwater Seafood
Emery's Seafood — Seabrook
Rice Food Markets No. 1-2-3-12-13-20-29
The Dutchman's Seafood-Wholesale
WATCH THIS AD EACH WEEK FOR OTHER LOCATIONS
PICK UP SUPPLY OF THESE DELICIOUS MUCH SOUGHT AFTER LOUISIANA DELICACIES. RECIPES FOR PREPARING CRAWFISH DISHES CAJUN STYLE ARE FREE AT ATHE ABOVE PLACES

THE HOUSTON POST
THURSDAY, MARCH 13, 1975

CRAWFISH
TAILMEAT CAN NOW BE PURCHASED
FRESH, CLEANED, QUICK FROZEN OR CHILLED
NOW
AVAILABLE IN HOUSTON AT THE FOLLOWING PLACES
Glatzmaier Seafood Market
Bill's Fish Market AIRLINE SEAFOOD
Deepwater Seafood
Emery's Seafood — Seabrook
Rice Food Markets No. 1-2-3-12-13
The Dutchman's Seafood-Wholesale
WATCH THIS AD EACH WEEK FOR OTHER LOCATIONS
PICK UP SUPPLY OF THESE DELICIOUS MUCH SOUGHT AFTER LOUISIANA DELICACIES. RECIPES FOR PREPARING CRAWFISH DISHES CAJUN STYLE ARE FREE AT ATHE ABOVE PLACES

THE HOUSTON POST
THURSDAY, MARCH 20, 1975

RADIO SCRIPT SUBMITTED BY USL RESEARCH GROUP:
(edited as of 2/11/75)

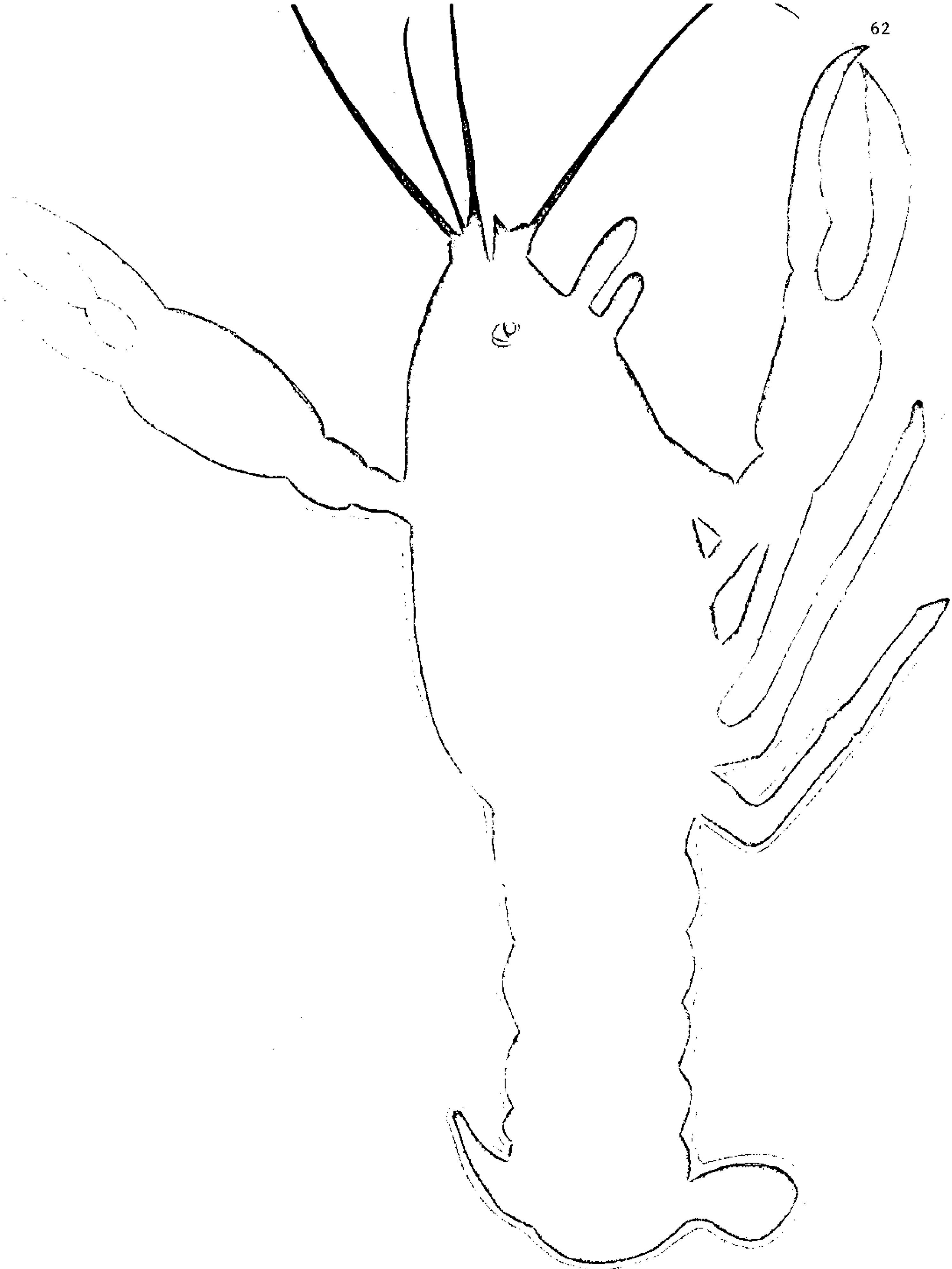
Crawfish- now available in Houston. For your dining pleasure, crawfish entrees prepared in the best Cajun tradition are available at these restaurants: Chez Orleans; Jimmy Walkers; Hilliards in Crosby, Texas; Hyden's in Spring, Texas; and at the dining rooms of the Shamrock Hilton Hotel.

Crawfish- now available in Houston. Fresh, cleaned, quick frozen or chilled, crawfish tail meat can be purchased at: Glatzmaier's Seafood Market, The Fishery, Deepwater Seafood, Emery's Seafood Market in Seabrook.

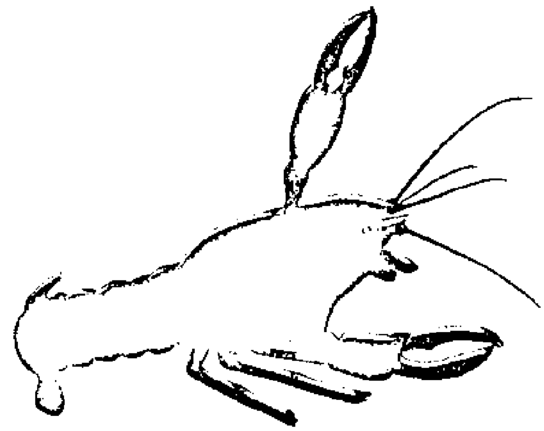
Pick up a supply of these delicious, much sought after Louisiana delicacies. Recipes for preparing crawfish dishes Cajun style are free at the retail outlets.

CRAWFISH

FROM LOUISIANA



CRAWFISH



FROM LOUISIANA

NOW AVAILABLE FOR YOUR DINING ENJOYMENT

CRAWFISH

Now Available for
Your Enjoyment

Recipe: Crawfish Etoufee — 4-5 servings

6 Tbs. butter or margarine
2 C. chopped onions
2 med. clove garlic, minced ($\frac{1}{2}$ tsp.)
2 Tbs. green pepper, chopped
$\frac{1}{4}$ c. celery, chopped
2 Tbs. minced parsley (1 tsp. dehydrated)
2 Tbs. green onion, chopped fine
1 lb. or $2\frac{1}{2}$ c. crawfish meat
$1\frac{1}{4}$ tsp. black pepper
$1\frac{1}{4}$ tsp. salt
$\frac{1}{8}$ tsp. red pepper

Melt butter in iron skillet or heavy pot. Saute onoins, garlic, green pepper, and celery until onions are clear. Add $\frac{1}{8}$ c. water and simmer covered until vegetables are tender (about 15 min.). Add crawfish meat, and cook covered for 20 min. on very low heat. Stir occasionally. Add green onions, parsley, and seasonings; cook five minutes on low heat. Let stand 5 minutes for seasoning to blend. Serve with rice.

APPENDIX III

STATISTICAL ESTIMATION PROCEDURES

APPENDIX

Procedure for Estimating Predicted Test Market Sales

Previous research has indicated that early adopters of crawfish tend to be households whose heads are 30 or over years of age, employed in a white collar occupation and earn over $12,500 per year.[1] Also, heavy consumers of crawfish products tend to be households with school-aged children.[2] These four characteristics identify the best market segment for initial introduction of crawfish. The test market was designed to reach a small portion of Houston households with the above characteristics. These kinds of households have consumed approximately two servings of crawfish every five weeks in earlier research.[3] Thus, predicted sales estimates can be obtained once the number of these early adopter households reached by the test market is determined.

U. S. Census[4] data reveal that 188,131 individuals earn over $12,000 per year in Houston. Also, 95.4 percent of these individuals are in families, and 88 percent of the families in Houston are husband-wife families. Thus, 165,555 husband-wife families in Houston have incomes over $12,000 per year. Previous research[5] has shown that 70 percent of these households, or 115,888 households, would likely be early adopters of crawfish.

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[1] Griffin, _An Identification_.

[2] _Ibid_.

[3] Griffin, _Consumption of Crawfish Dishes_.

[4] _U. S. Census of Population_, 1970.

[5] Griffin, _An Identification_.

The number of white collar male employees in Houston is estimated to be 185,327. Again only 176,802 of these would be expected to be in families, and only 155,585 would be in husband-wife families. Previous research[6] indicates that approximately 65 percent, or 101,180, of these households would be early adopters of crawfish.

Of the 232,493 employed males in the 30-49 age group only 157,946 are expected to be in husband-wife families. Previous research[7] indicates that 70 percent, or 110,562, of these families would be early adopters of crawfish.

The average of the three estimates of the total number of early adopters of crawfish is 109,210 households. At a consumption rate of two servings of crawfish per household every five weeks, 43,684 servings would be consumed every week. Based on past research, 56 percent, 24,463 servings, would be consumed in restaurants and the remaining 44 percent, 19,221 servings, would be consumed in the home.[8]

The numbers of potential servings per week must now be adjusted to reflect the fact that only a small portion of the 109,210 households were reached with the limited number of retail outlets used during the test market. An average of only seven seafood restaurants out of an estimated total of 144 seafood restaurants in Houston participated in the study. Seven restaurants are equivalent to 4.86 percent of the total. Estimated test market restaurant sales are 4.86 percent of 24,463 total potential restaurant sales or 1190 servings per week.

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[6] Ibid.

[7] Ibid.

[8] Griffin, Consumption of Crawfish Dishes.

Six out of 58 seafood markets in Houston participated in the test market. The six seafood markets are 10.3 percent of the total number of seafood markets, and 10.3 percent of 19,221 total potential home consumption is 1980 estimated test market home servings per week.

Estimation of Potential Sales in Texas SMSA's

The estimated total sales in Houston given in Chapter III are based on the assumption that 80 good seafood restaurants and 48 seafood markets in Houston feature crawfish products. Also, the assumption is that both restaurants and seafood markets would sell the tail meat and live crawfish in the proportions observed during the test market period.

Before extending the test market results to other Texas SMSA's the number of good seafood restaurants and seafood markets that would be supported by early adopters of crawfish must be determined for each SMSA. The numbers of early adopters for each Texas SMSA is given in Table XI.

TABLE XI

ESTIMATED NUMBER OF "EARLY ADOPTER HOUSEHOLDS" FOR TEXAS SMSA'S

SMSA	Estimate From: Social Class	Income	Age	Average
Abilene	4652	3778	4804	4411
Amarillo	7540	4659	7457	6552
Austin	16612	14188	10144	13648
Beaumont	11444	14804	17468	14752
Brownsville	3569	2464	5215	3749
Bryan	3345	2198	1749	2430
Corpus Christi	10598	10646	14150	11798
Dallas	85725	95815	80365	87301
El Paso	12025	11814	15873	13237
Fort Worth	38801	45513	42662	42325
Galveston	7051	9080	9017	8382
Houston	101,180	115,888	110,562	109,210
Laredo	1749	1107	2745	1867
Lubbock	8842	7339	7420	7867
McAllen	1519	3035	7173	3909
Midland	4577	4332	4481	4463
Odessa	4049	4306	5977	4777
San Angelo	2805	2491	3024	2773
San Antonio	29,401	30,543	35,790	31,911
Sherman	3089	3148	3756	3331
Tex-Arkana	3526	3492	4401	3806
Tyler	4340	4073	4871	4428
Waco	6090	5119	5797	5668
Wichita Falls	5050	4663	5625	5112
Total				397,707

Houston is a coastal city known for good seafood. Other Texas cities, Fort Worth for example, are known as "steak towns." A given number of early adopters in Fort Worth would support fewer potential seafood outlets than the same number of early adopters in Houston. Thus, the numbers of early adopters in Table XI were adjusted by an index of seafood consumption in order to get a more realistic estimate of the effective numbers of early adopters. Houston seafood consumption serves as the base of the index. The index numbers are subjective estimates of the relative seafood consumption of other Texas SMSA's. Table XII gives the index numbers and effective numbers of early adopters of crawfish. The effective number of early adopters is obtained by multiplying the index and the estimates of early adopters from Table XI.

In Houston 109,210 early adopters are estimated to support 80 good seafood restaurants. This is an average of one good seafood restaurant per 1365 early adopter households. Thus the estimated numbers of participating outlets given in Table VII, Chapter III are obtained by dividing 1365 into the effective numbers of early adopters given in Table XI. The estimated number of participating seafood markets in Table VII is obtained by taking 60 percent (or 48/80) of the number of participating restaurants. Numbers of restaurants and seafood markets were rounded to the nearest whole numbers. The sales potential in Table VII is obtained by adding $213 weekly sales for each restaurant and $281 per week for each seafood market. The sales potential reflects the anticipated purchases of crawfish by the outlets.

TABLE XII

EFFECTIVE NUMBERS OF EARLY ADOPTERS FOR TEXAS SMSA'S

SMSA	Index	Effective Number of Early Adopters
Abilene	.4	1980
Amarillo	.4	2621
Austin	.6	8189
Beaumont	1.0	14,752
Brownsville	.7	2624
Bryan	.4	972
Corpus Christi	.8	9438
Dallas	.6	52,380
El Paso	.4	5295
Fort Worth	.5	21,162
Galveston	1.0	8382
Houston	1.0	109,210
Laredo	.4	747
Lubbock	.4	3147
McAllen	.5	1954
Midland	.5	2232
Odessa	.5	2388
San Angelo	.4	1109
San Antonio	.5	15,956
Sherman	.4	1332
Tex-Arkana	.5	1903
Tyler	.5	2214
Waco	.5	2834
Wichita Falls	.5	2556
Total		275,377

APPENDIX IV

CRAWFISH RELATED RESEARCH PERFORMED AT THE UNIVERSITY OF SOUTHWESTERN LOUISIANA

APPENDIX

A BIBLIOGRAPHY OF TITLES OF CRAWFISH RESEARCH STUDIES COMPLETED AT THE UNIVERSITY OF SOUTHWESTERN LOUISIANA

Production

Maturation of Crawfish Ovaries under Varied Temperature Influences

Effects of DDT and Other Field Applied Insecticides and Herbicides on Louisiana Crawfish

Crawfish Predation by Herons, Egrets, etc.

Parasites of Crawfish

Experimental Introduction of the Australian Crayfish into Louisiana

Detection of Dissolved Substances by Louisiana Crawfish

Behavioral Responses of Commercial Crawfish to Acoustic Signals

Crawfish Boat Method Harvesting in the Louisiana Marshes

Crawfish Depredation in Rice Fields

Procedures for Improving Small, Non-Commercial Crawfish Ponds

A New Technique for Handling Crawfish Traps

Processing

Microbiological Investigation of the Commercial Crawfish

Effects of Handling and Storage on Abdominal Muscle of Crawfish Under Different Conditions of Handling and Storage

Chemical Analyses of Crawfish Flavor

Use of the Morgan and Day Technique for Head Space Analysis as an Indication of Chemical Changes Resulting From Storage of Crawfish Fat

Crawfish Quality Analysis Following Frozen Storage

Waste Utilization

Crawfish Waste Utilization

Marketing

Development of Recipes for Crawfish

An Evaluation of Distribution Channels for South Louisiana Crawfish

A Quantitative Analysis of the Amounts of Crawfish That Move Through Distribution Channels

A Study of the Consumption of Various Crayfish Dishes Among Non-Natives of South Louisiana

An Investigation of the Potential for Expansion of the Supply of South Louisiana Crawfish and Crawfish Processing Facilities

An Estimate of Market Potential for South Louisiana Crawfish