

Grocery Stores in California

analytical study of representative retail grocery stores made to determine factors affecting store characteristics

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The first of a series of reports of a survey of characteristics of retail grocery stores in five counties in California made cooperatively by Departments of Home Economics, University of California, Berkeley and Davis, and the United States Department of Agriculture, under the authority of the Research and Marketing Act as part of Western Regional Research Project WM-26.

Retail grocery stores in five counties in California were surveyed to determine their characteristics with respect to rural-urban relationship, shopping area, ownership, and size as indicated by number of equivalent full-time employees. The 1,028 stores surveyed in Alameda, Butte, Fresno, Los Angeles, and San Diego counties were selected at random in order to be representative of all retail grocery stores in each of these counties.

Selection of the counties to be surveyed was based on 1, population, 2, number of retail stores, and 3, sales volume of retail stores. In order to survey counties which were representative of the retail pattern of the entire state, counties which contained varying proportions of these three factors were selected. The five counties selected contained over half of the state's population and half of the

Surveyed Counties Relative to State

| County | State population | State retail food stores* | State sales retail grocery stores |
|-----------------|------------------|---------------------------|-----------------------------------|
| | 1950 | 1954 | 1954 |
| | % | % | % |
| All counties .. | 54.7 | 49.7 | 56.1 |
| Butte | 0.6 | 0.7 | 0.6 |
| Fresno | 2.6 | 3.4 | 2.5 |
| San Diego ... | 5.3 | 4.6 | 5.1 |
| Alameda | 7.0 | 8.3 | 5.9 |
| Los Angeles .. | 39.2 | 32.7 | 42.0 |

* Includes grocery, meat, fish, fruit and vegetable, confectionery, bakery products and delicatessen stores.

retail food stores—delicatessen, bakeries, grocery, and others. The stores in these counties accounted for 56% of the sales of all food stores and also 56% of the sales of all grocery stores.

Rural-urban Location

Most of the retail grocery stores surveyed were in rural areas that included towns and villages with less than 2,500 population and the open country. The proportion of rural to urban stores varied considerably from county to

county. Butte and Fresno counties had the largest proportion of rural stores. San Diego County had a smaller proportion and fewer than 1% of the stores in Alameda and Los Angeles counties were in rural areas.

In terms of shopping areas, the rural stores tended to be isolated stores, that

Rural-Urban Stores

| County | Location of stores | |
|-------------------|--------------------|---------|
| | Rural % | Urban % |
| Butte | 28.5 | 71.5 |
| Fresno | 29.6 | 70.4 |
| San Diego | 11.6 | 88.4 |
| Alameda | 0.6 | 99.4 |
| Los Angeles | 0.7 | 99.3 |

is, they were not near any other retail stores. For example, in the two counties with the largest proportion of rural stores, Butte and Fresno, 68%–71% of the rural stores were isolated as compared with 10%–17% of the urban stores.

The majority of the urban stores were concentrated in neighborhood or secondary shopping areas. More than four fifths of the urban stores in Alameda, Los Angeles, and San Diego counties were located in such areas rather than in downtown or isolated areas.

In both rural and urban areas independents rather than chains predominated. In the rural areas, the proportions of stores which were independently owned were much higher than in the urban areas. All the rural stores in Alameda, Los Angeles, and Fresno counties were independently owned. In Butte County 94% and in San Diego County 89% were independently owned. On the other hand, 93% of the urban stores in Fresno County, 84% in Butte and San Diego counties, 79% in Los Angeles County, and 58% in Alameda County were independently owned.

The smaller stores, as indicated by the number of equivalent full-time employees, were relatively more numerous in the rural than in the urban areas. In Butte and Fresno counties three fourths of the rural stores as compared with approximately one half of the urban stores had one or two full-time employees. No store classified as rural had 15 or more employees. However, 5%–16% of the

stores classified as urban in the different counties had this many full-time employees.

In line with current retailing trends, the majority of grocery stores were located in neighborhood or secondary shopping areas. The relative importance of the stores in these shopping areas varied greatly from county to county. In Los Angeles County almost nine tenths of all the stores surveyed were in neighborhood or secondary shopping districts as compared with slightly over one half of the stores in Butte County.

The proportions of isolated stores varied more from county to county than the proportions of downtown stores. In Butte and Fresno counties 28%–31% of the stores were isolated as compared with 3%–5% in Alameda and Los Angeles Counties.

Shopping Areas

| County | All areas % | Isolated % | Downtown % | Neighborhood or secondary % |
|---------------|-------------|------------|------------|-----------------------------|
| | | | | |
| Butte | 100.0 | 31.2 | 15.6 | 53.2 |
| Fresno | 100.0 | 28.3 | 13.2 | 58.2 |
| San Diego .. | 100.0 | 11.0 | 9.0 | 80.0 |
| Alameda ... | 100.0 | 4.8 | 12.0 | 83.2 |
| Los Angeles.. | 100.0 | 3.8 | 8.5 | 87.7 |

Practically all, 90%–100%, the downtown stores were in urban areas in four counties. In San Diego County 21% of these stores were in rural areas.

Independents predominated in each of the three shopping districts studied. However, the downtown shopping district in each county had a higher proportion of chains relative to independents than either of the other shopping districts. For the five counties, 15%–41% of the downtown stores, 8%–21% of the neighborhood or secondary stores, and 0–18% of the isolated stores were units of chains.

The majority of isolated and neighborhood or secondary stores were small stores, that is, they employed one or two equivalent full-time persons. The majority of downtown stores were somewhat larger since they employed the equivalent of one to six full-time persons. A higher proportion of stores in the downtown district than in the other districts were larger stores, that is, they employed seven or more persons. The counties

varied considerably in the relative importance of the latter stores. For example, in Los Angeles County 42% of the downtown stores as compared with 10% of those in Fresno County employed seven or more full-time persons.

Ownership

As indicated in the previous section the retail grocery stores surveyed in each of the five counties were primarily independently owned and operated as single units. In the five counties 79%-93% of the stores were so classified.

For the most part these independent stores were located in neighborhood or secondary shopping districts, in urban areas and were relatively small stores. From 68%-99% were in urban areas. However, in Butte and Fresno counties about 31% were in rural areas. In San Diego County 12% were so located.

In all the counties the majority of stores were in neighborhood or secondary shopping districts. From 53%-88% were in these areas, 4%-6% were isolated stores, and 8%-11% were in downtown districts.

The majority of the independently operated stores had one to six employees. From 62%-76% had only one or two employees; 21%-30% had three to six employees. From 1%-7% had seven to 14 employees and less than 1%-4% had 15 or more.

A considerable portion of the single unit stores were affiliated with other single unit stores for the purpose of engaging in cooperative activities such as buying and advertising. From 24%-49% of the independent stores in the five counties were members of such cooperative groups.

The variation in location as to rural-urban area of affiliated and nonaffiliated

| County | % of all stores | % of independents (single-unit stores) | |
|-------------|-----------------|--|---------------|
| | | Affiliated | Nonaffiliated |
| Butte | 86.2 | 42.6 | 57.4 |
| Fresno | 93.4 | 23.9 | 76.1 |
| San Diego | 85.4 | 24.4 | 75.6 |
| Alameda | 82.5 | 28.7 | 71.3 |
| Los Angeles | 79.1 | 49.1 | 50.9 |

independents was small in each county, the majority of stores in each group being located in urban areas.

The proportions of stores which were isolated were higher for the nonaffiliated stores than for the affiliated ones in Butte and Fresno counties. In these counties the proportions of isolated stores were much higher than in the more populous counties for both types of independents. The tendency was for the proportions of affiliated stores which were located in downtown shopping areas to be

larger than the proportions of the non-affiliated stores.

The independents not affiliated with cooperative groups tended to hire fewer employees than those which were affiliated. From 70%-85% of the nonaffiliated stores in each county employed one or two persons as compared with 29%-67% of the affiliated stores.

Chain stores, that is, those which were owned and operated as groups of two or more stores, accounted for only one fifth or less of all the stores surveyed in each of the counties.

| County | % of all stores | Chain Stores (multi-unit stores) | |
|-------------|-----------------|----------------------------------|---------------------------|
| | | 2-24 units in state | 25 or more units in state |
| Butte | 13.8 | 80.0 | 20.0 |
| Fresno | 6.6 | 60.0 | 40.0 |
| San Diego | 15.5 | 61.1 | 38.9 |
| Alameda | 17.5 | 20.6 | 79.4 |
| Los Angeles | 20.9 | 52.3 | 47.7 |

As might be expected, the chains varied greatly in number of units operated. In each of the counties there were some stores which were members of organizations operating 100 or more units in the state. In all the counties except Alameda the proportion of chains with less than 25 units in the state was higher than the proportion with 25 units or more. In Alameda County there were few small chains.

Chain stores were most frequently located in urban areas. In Alameda, Los Angeles, and Fresno counties all the chains were in these areas. In San Diego County 8% and in Butte County 13% of the stores were in rural areas.

The location of chain stores according to shopping area varied greatly from county to county. However, in each county the largest proportion of chains, 53%-86%, were in neighborhood or secondary shopping districts. The smallest proportion was in Butte County and the largest proportion was in Los Angeles County.

The proportions of chain stores which were in downtown areas were largest in Butte and Fresno counties, 48% and 30% respectively. In the other counties only 17% in Alameda, 13% in San Diego, and 11% in Los Angeles were in these areas. The highest proportion of isolated chain stores, 12%, was in San

Diego County. While no chains were isolated in Butte and Fresno counties, 3% of the chain stores in Alameda County and 3% in Los Angeles County were isolated.

Proportionally chains more frequently employed more equivalent full-time persons than the independents. In Los Angeles County 68% of the chains employed 15 or more persons. In the other counties 31%-40% employed this many. In Alameda County 52% of the chains employed seven to 14 persons while in each of the other counties 20%-32% had this many employees. From 10%-40% of the chains had three to six employees and only 3%-5% had as few as one or two employees.

Number of Employees

The majority of the grocery stores surveyed was small stores. From 50%-63% of the stores in each county employed one or two equivalent full-time persons, 20%-30% employed three to six persons, 6%-10% employed seven to 14 persons, and 3%-16% employed 15 or more persons. Los Angeles County had the lowest proportion of small stores, 50%, and the highest proportion of very large stores, 16%. Los Angeles County was also the only county having stores employing 63 or more persons; 3% of the stores employed this many.

In terms of ownership, stores employing one to six persons were predominantly independently owned; whereas, stores employing 15 or more persons were predominantly owned by chains. Stores employing seven to 14 persons were as likely to be owned by independents as by chains.

Types of Goods Carried

The results of the survey indicate that most retail grocery stores in California carry a considerable range of products. Most of those surveyed carried staple groceries, dairy products, some kind of meat, and some kind of fruits and vegetables.

From 98%-100% of the stores surveyed carried staple groceries, dairy products, and meat. Fresh or frozen fruits and vegetables—or both—were available in almost as high a proportion

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| County | Stores Carrying Specific Products | | | | | | |
|-------------|-----------------------------------|----------------|------|---------------------------------|----------------|----------------------|----------------|
| | Staple groceries | Dairy products | Meat | Fresh and/or frozen fts. & veg. | Dietetic foods | Notions and/or drugs | Lunch counters |
| | % | % | % | % | % | % | % |
| Butte | 100.0 | 100.0 | 96.3 | 99.0 | 39.4 | 90.8 | 4.6 |
| Fresno | 93.3 | 99.4 | 99.3 | 96.1 | 41.1 | 93.4 | 9.2 |
| San Diego | 100.0 | 100.0 | 99.3 | 98.7 | 57.1 | 92.9 | 4.5 |
| Alameda | 98.2 | 98.6 | 98.2 | 97.0 | 60.2 | 71.7 | 1.2 |
| Los Angeles | 99.5 | 98.9 | 99.1 | 94.4 | 60.4 | 92.4 | 4.9 |

Natural Food Flavor Intensity

apricot, peach, and pear nectars studied to determine the sweetness-acid-flavor relationship in a natural food product

Rose Marie Pangborn, Marion J. Simone, and Elly Hinreiner Platou

Flavor and sweetness are closely related factors—especially in fruit products—but there exists a level at which added sucrose ceases to enhance the flavor of the product and the relationship between sweetness and flavor is influenced by acidity.

A study to determine sweetness-acid-flavor relationship was conducted with fruit nectars made from Blenheim apricots, Bartlett pears, and Halford cling peaches. All nectars consisted of 55% fruit and 45% water by weight, with no added syrup. The raw fruit was put through a pulper, blended with water and poured into cans. Cooking times were 40 minutes at 210°F for apricot, 32 minutes at 210°F for pear, and 40 minutes at 212°F for the peach nectar.

A laboratory taste panel of 16 to 22 judges, selected for their ability to detect small differences in concentrations of sucrose and acid, evaluated the nectar samples over a period of three months. The samples were always tasted at mid-morning and at room temperature.

When the unsweetened apricot control was compared with apricot nectar containing 4% or 8% sucrose, a highly significant number of responses ascribed more flavor to the sweeter sample. In addition, there was a decided preference for the nectar with the greater amount of sucrose. Although that preference was apparent when the 8% sucrose sample was compared directly with the sample containing 4% sucrose, the difference was not statistically significant.

Addition of organic acids appeared to balance the sweetness and to enhance the flavor of the nectars to a significant degree. The addition of acid to unsweetened

nectars unbalanced the sweetness-acid relationship and decreased apparent flavor intensity.

Responses to the addition of both sucrose and acid indicated a significant tendency to ascribe more flavor to the sample with the higher ratio of soluble solids to acid.

In general, sucrose—in the percentages employed in this investigation—enhanced natural apricot flavor. Addition of organic acids increased palatability, especially when accompanied by the addition of sucrose. Preference appeared to be based on sweetness and on acidity as well as on the ratio of these two factors.

When samples containing 4%, 6%, 8% or 10% added sucrose were compared the 8% sucrose sample appeared to be the most flavorful and was preferred most frequently. The intensity of the natural fruit flavor depends on an optimum soluble solids content in proportion to an optimum acidity. For apricot nectar, these optimum values were 16°–18° Brix—specific gravity—for the soluble solids and 0.56%–0.59% acid.

Responses of the judges to sweetened pear nectar show a trend similar to that for the apricot nectar. There was a highly significant degree of accuracy in identification of the sweetest sample in all series, a dislike for the least sweet nectar, association of preference with the most flavorful sample, and correlation of flavor and preference with the soluble solids-acid ratio.

When four samples of peach nectar containing 4%, 6%, 8% and 10% sucrose were presented to the judges the 8% sucrose level was designated as the

most flavorful and most liked. However, when samples with sucrose levels of 6%, 8%, 10% and 12% were evaluated, preference shifted toward the 10% level, indicating a tendency toward preference for the second sweetest sample.

The addition of citric acid to sweetened peach nectar samples did not produce a shifting of preference to the sample originally preferred as might be expected. Instead, the judges responded to the acidified nectars in much the same manner as to the unacidified samples, placing them in the same relative order. The samples containing 9% sucrose and acidified with 1.5% acid were the best liked.

In these flavor evaluation tests, the judges associated preference with the sample they considered most flavorful. Apparently, flavor intensity depends on the ratio of optimum soluble solids and optimum acidity. There was a high degree of accuracy in identifying the sweetest sample in all series, and—in general—there was a dislike for the least sweet nectar. Preferred soluble solids-acid ratio for apricot nectar was approximately 30; for pear nectar, 160; and, for peach nectar, 40.

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GROCERY STORES

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of stores. From 94%–99% of the stores in each of the counties carried these products. From 40–60% of the stores carried dietetic foods and these stores were found to be most common in the metropolitan areas.

Notions and/or drugs were carried almost as commonly in the grocery stores surveyed as were food products. From 91%–93% of the stores carried some of

these goods. From 1%–9% had lunch counters. The highest proportion of stores with lunch counters was in Fresno County and the lowest in Alameda County.

All stores in all five counties with seven or more employees carried staple groceries, dairy products, some fruits and vegetables and some meat. The proportions carrying these products were slightly higher in stores with three to six employees than in those with one or two employees. Likewise all the chains

and the independents who were affiliated with other independents in cooperative groups carried these goods. The nonaffiliated independents did not carry these goods quite so frequently.

In the case of notions or drugs the proportions of stores in the different counties carrying these goods increased as number of employees increased. They were also carried more frequently by chains than in independent stores. In the metropolitan counties the proportion of stores carrying notions or drugs—or

Spider Mite on Walnuts

promising results obtained with three miticides tested in control experiments in infested walnut orchard at San Jose

A. E. Michelbacher

The most destructive species of spider mites—found in localities where experimental investigations were conducted in 1956—was the European red mite. Infestations of the Pacific spider mite and the two-spotted spider mite were limited and noneconomic.

In the experimental orchard at Linden, damage caused by the European red mite was masked by that done by the false spider mite—*Brevipalpus lewisi* McGregor—whose population reached a level sufficiently high to cause some defoliation before the end of September. Most of the defoliation was limited to the lower parts on the southeast portion of the trees, but where large mite populations were present the damage extended about two thirds up the tree. The injured spots had a scorch-like appearance. Where this situation was found, the false spider mite occurred in swarms and serious defoliation had taken place. It was apparent that the damage done by the false spider mite far exceeded that inflicted by the European red mite.

Spider mites were present in all the areas where experimental studies were conducted. In most of the orchards the populations were adequately checked by natural enemies but—in some cases—the spider mite feeding became noticeable before the pest population was reduced to a nondestructive level.

Chemical control measures directed against spider mites were conducted in an orchard at San Jose, selected because it was subjected—in 1955—to a destructive infestation of the European red mite.

both—was higher in isolated stores than in downtown and neighborhood or secondary districts. In Butte and Fresno counties the proportions of stores carrying these goods were highest in downtown stores.

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The sampling procedures were developed by E. B. Roessler, Professor of Mathematics, and George Baker, Professor of Mathematics, University of California, Davis.

Treatments and Average Number of European Red Mites Per Sample of Walnut Leaf^a

| Treatments, amount applied per acre in pounds, and date of application ^b | Average number of mites per leaf sample on: | | | | | | |
|--|---|-------------------|-------------------|----------|-----------|-----------|---------|
| | July 16 | July 19 | July 27 | August 2 | August 15 | August 24 | Sept. 3 |
| Check | 1.63 | 3.56 | 12.89 | 16.95 | 13.78 | 29.96 | 3.56 |
| Kelthane, 18.5% W.P. 8.4 pounds. Applied May 18 ^c (actual per acre 1.55 pounds) | 0.00 | 0.13 | 0.02 | 0.20 | 0.45 | 3.92 | 0.57 |
| Kelthane, 18.5% W.P. 4.75 pounds. Applied July 27 ^d (actual per acre 0.88 pounds) | 2.37 | 9.85 ^e | 0.17 | 3.22 | 0.88 | 0.61 | |
| Kelthane, Emulsion 2 pounds per gal. Applied July 27 ^e (actual per acre 2.3 pounds) | 1.97 | 1.84 | 9.85 ^e | 1.27 | 0.15 | 0.23 | 0.87 |
| Trithion, 25% W.P. 11 pounds. Applied July 16 ^d | 2.16 ^f | 0.03 | 0.12 | 0.00 | 0.04 | 0.07 | 0.04 |
| Nialate, 25% W.P. 13 pounds. Applied July 16 ^f | 1.27 ^f | 0.24 | 0.00 | 0.00 | 0.00 | 0.09 | 0.25 |

^a Leaf samples 15 mm in diameter.

^b All treatments applied with an air carrier sprayer.

^c Incorporated with the codling moth spray and applied in approximately 190 gallons of water per acre.

^d Applied in approximately 210 gallons of water per acre.

^e Applied in approximately 225 gallons of water per acre.

^f Applied in approximately 260 gallons of water per acre.

^g Pretreatment count.

Three mite materials—Kelthane, experimental compound R-1303—Trithion—and experimental Niagara-1240—Nialate.

In anticipation of a European red mite outbreak, a Kelthane 18.5% wettable powder was incorporated with the codling moth spray applied on May 18. It was used at the rate of 8.4 pounds per acre and applied in approximately 190 gallons of water per acre with an air carrier sprayer. Other treatments for the control of the European red mite—all applied with an air carrier sprayer—were delayed until the pest population developed to a level where control measures were justified.

In making mite population determinations, next-to-terminal leaflets were picked at random from the south side of the trees, and from areas that showed evidence of mite feeding. On each survey 25 leaflets were collected from no less than five trees in each plot. In making counts, three impressions were made, about equally spaced, along the midrib of each leaflet and—with the exception of the eggs—all stages of the mites within the impressions were counted.

All treatments—as shown in the large table—resulted in satisfactory control. Kelthane had excellent holding power where it was incorporated with the May 16 codling moth spray. The two experimental materials, Trithion and Nialate,

resulted in unusually good control. Both materials—especially 1240—appeared to exhibit considerable ovicidal action and not to be particularly harmful to predatory mites. The dosage of Kelthane wettable powder used for summer control apparently was at the lower limit to insure commercial control.

Result of Crack Test at Harvest

| | % sound | % with light colored meats | Weight of meats per 100 nuts in grams |
|---------------|---------|----------------------------|---------------------------------------|
| Check | 90 | 68 | 494 |
| Trithion | 98 | 85 | 549 |

All the treated plots remained in fine condition up and through harvest. In contrast, the trees in the check plots suffered serious defoliation and by harvest the ground beneath them was covered with leaves. A large predator population developed in the check plots, but occurred much too late to save the trees from serious damage. At harvest a crack test was conducted to determine the quality of the crop. The best nuts were obtained from the trees that were protected from the European red mite. The test also indicated that a considerable amount of spider mite damage is needed to produce a noticeable decrease in the quality of the crop.

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