

# Frozen Fruits and Vegetables

production of frozen vegetables and deciduous fruits by west coast packers responded to rapid upward trend in consumption

Robert H. Reed

Over 60% of the total United States frozen pack of deciduous fruits and vegetables is produced by California, Oregon, and Washington, according to a study based on the latest available data.

The same states produce approximately 80% of the total frozen pack of strawberries and bush berries, 60% of the peaches, 40% of the snap and wax beans, 65% of the lima beans, and 70% of the green peas. Also, almost the entire national pack of frozen Brussels sprouts and apricots, and large percentages of the cauliflower, broccoli, carrot, and spinach packs are produced on the West Coast.

Since 1945 there has been a rapid upward trend in frozen vegetable production in both California and the Northwest. These areas have shown average annual increases of over 20,000 tons per year for all vegetables combined. Commodities with greatest rates of growth in California are lima beans which have increased an average of 6,000 tons yearly, followed by similar increases in the production of spinach, broccoli, cauliflower, green peas and Brussels sprouts. In the Northwest, frozen pea processing has grown over 10,000 tons annually, followed by cut corn, broccoli, and carrots. Deciduous fruit production has leveled off and is declining slightly in both areas.

About 70% of the Pacific Coast frozen fruit and vegetable processors perform only the receiving, preparation, and packaging operations and depend upon commercial cold storage companies to do the freezing and initial storage at a regular service charge. The remaining plants own all or part of their freezing and storage facilities. Net capacity of refrigerated warehouses, which are capable of holding temperatures at 0°F or lower, has increased 47 million cubic feet in the Pacific Coast area since 1945. However, there is evidence that there is still a shortage of cold storage space in a few processing areas.

The greatest concentration of freezing plants in Washington is in the northwestern section along the Puget Sound and in the Yakima Valley. Oregon has two principal areas of concentration—the Willamette Valley of western Oregon and the Pendleton area of northeastern Oregon. In California the largest number of plants are located in the Santa Clara, Pajaro, and Salinas valleys. Next in im-

portance is the area bounded on the north by Yuba City and on the south by Sanger in the Central Valley. The south coastal area from San Luis Obispo to Los Angeles is also important.

## Annual Volume of Pack

A large part of the Pacific Coast pack is produced by relatively few plants. Nearly 30% of the total production is packed by 10% of the plants and slightly over 65% is produced by 25% of the packers. The distribution of annual volume among plants falls short of providing an index of plant size in the sense of capacity output rates, because annual volume is affected by length of season as well as by capacity rates. Among the plants surveyed the average capacity rates of plants processing lima beans and green peas—for example—varied from slightly under 5,000 pounds to over 30,000 pounds per hour with a typical range between 8,000–9,000 pounds per hour of operation. Average capacity rates of plants processing hand-packed commodities such as Brussels sprouts or broccoli ranged from a low of 3,000 pounds to over 15,000 pounds per hour with a typical capacity rate between 5,000 and 6,000 pounds per hour of operation.

## Volume of Employment

The volume of employment required by the Pacific Coast plants for in-plant processing corresponds to the variation in volume of output. An estimated 12,000 employees—excluding administrative, selling, maintenance and field personnel—were required for in-plant processing during the 1955 season.

Over one half of the plants surveyed employed 50 or fewer workers; roughly one third of the plants were in the range of 70–100 workers; approximately one tenth were in the range of 100–500; and 1% of the plants employed more than 500 workers. The smaller plants—those with fewer than 50 direct labor employees—were predominantly engaged in freezing berries. Plants in the medium range—with 70–100 workers—were mostly processors of single-product specialized fruit, berry, and smaller vegetables. Those in higher ranges were nearly all multiple-product plants.

Most of the labor is of a seasonal character, but the possibility of extending the length of season—by introduction of varieties with varying dates of maturity, in addition to the practice of processing several products—is being exploited by processors in each of the states involved. The increase in length of operating season by these means enhances the desirability of employment in the industry and increases the possibility of maintaining an adequate and permanent labor force with the likelihood of increased labor efficiency.

## Style of Pack

Products are packed in three styles—for retail, institutional, and bulk users. The retail pack varies from eight ounces to one pound according to the commodity or trade practices. The institutional pack varies from 2–10 pounds, but normally is packaged in 2- or 2½-pound paper cartons. Bulk packages cover the range from 10 pounds through 350 pound drums. Sales to institutional and industrial users are the principal outlets for the bulk-frozen output. In some plants, however, certain products such as lima beans and peas are bulk frozen and held for later repackaging. Sometimes this practice is followed because of limited capacity in the filling lines for

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smaller containers or to obtain flexibility as to the type of packaging for products held for future sale.

Over 70% of the total Pacific Coast frozen fruit and vegetable pack was sold through brokers in 1955. However, direct selling is an important method of sales. A firm with its own sales agency establishes outlets in different parts of a regional or national market and maintains space—as a rule—in key warehouses near large population centers. Products are moved to the warehouses and redistributed to customers as needed. Some packers make direct sales to national-brand freezers who market the commodities directly under their own label or through brokers. Direct sales to wholesale distributors, industrial and institutional outlets, and chain stores are practiced by about 30% of the packers in this region. The percentage of the total pack sold in this manner is not available from the survey data.

### Movement to Markets

Destinations of shipments originating in California, Oregon and Washington separately are not yet available, but preliminary results of a 1955 survey of

major rail and truck carriers in the Pacific Coast states show the distribution of rail shipments from California to designated regions during 1954. The major portion of California's production of frozen fruits and vegetables moves to points in the North Atlantic, East North Central, West North Central, Southeast, and West South Central regional markets. The heavily populated North Atlantic states are the most important market in terms of first unloads, having received 36.8% of the total shipments. The Southeastern area ranks second in receipts, having received 19.0% of the total shipments originating in California. The East North Central states accounted for 17.2% of California unloads and the West North Central states took 10.8%. The West South Central and Mountain regions were less important markets, accounting for only 4.4% and 2.5%. Large volumes moving into each of these regions go into intransit storage for later reshipment.

Total monthly shipments fluctuated relatively little during most of the year, excepting the first quarter. Peak shipments occurred in February, but minimum shipments the following month suggests that the impact of the heavy shipments in February was probably dissipated during the next 4-6 weeks.

It is likely that shipment rates are in-

fluenced by seasonal processing and by consumption patterns. Results from a study made by the Agricultural Marketing Service of the United States Department of Agriculture show that the consumption of frozen fruits and vegetables tends to be relatively stable throughout the year, with reductions in levels of consumption occurring during the period when the fresh product is available in the markets. The seasonal out-of-state shipment pattern in relation to consumption rates suggests that direct movement into consumption represents an important segment of total shipments. However, the fact that late spring and summer shipments are slightly above the annual average indicates that shipments into storage at intermediate transit or terminal market points may be greatest during these months, a period paralleling the processing season. It appears then that processing schedules play an important, though secondary, role in determining the seasonal shipment pattern.

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*This is the third in a series of progress reports on efficiency in the processing and marketing of frozen fruits and vegetables. The studies are being conducted cooperatively with the Experiment Stations in Washington, Oregon and Hawaii and the U.S.D.A., A.M.S.*