PACKING FRESH PEARS

Studies show the possibility of cost savings by the use of new type containers and large-scale plants

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Recent developments in packaging methods permit certain types of deciduous fruits to be packed by bulk-fill methods without adverse effect on the quality of fruit delivered to distant markets. In comparison with the traditional place-packed wooden container, the new method is a successfully tested means of filling fiber cartons. The mechanized bulk-fill of a nonreturnable pallet bin—as yet not tested in fresh shipments—is an additional prospect of great interest.

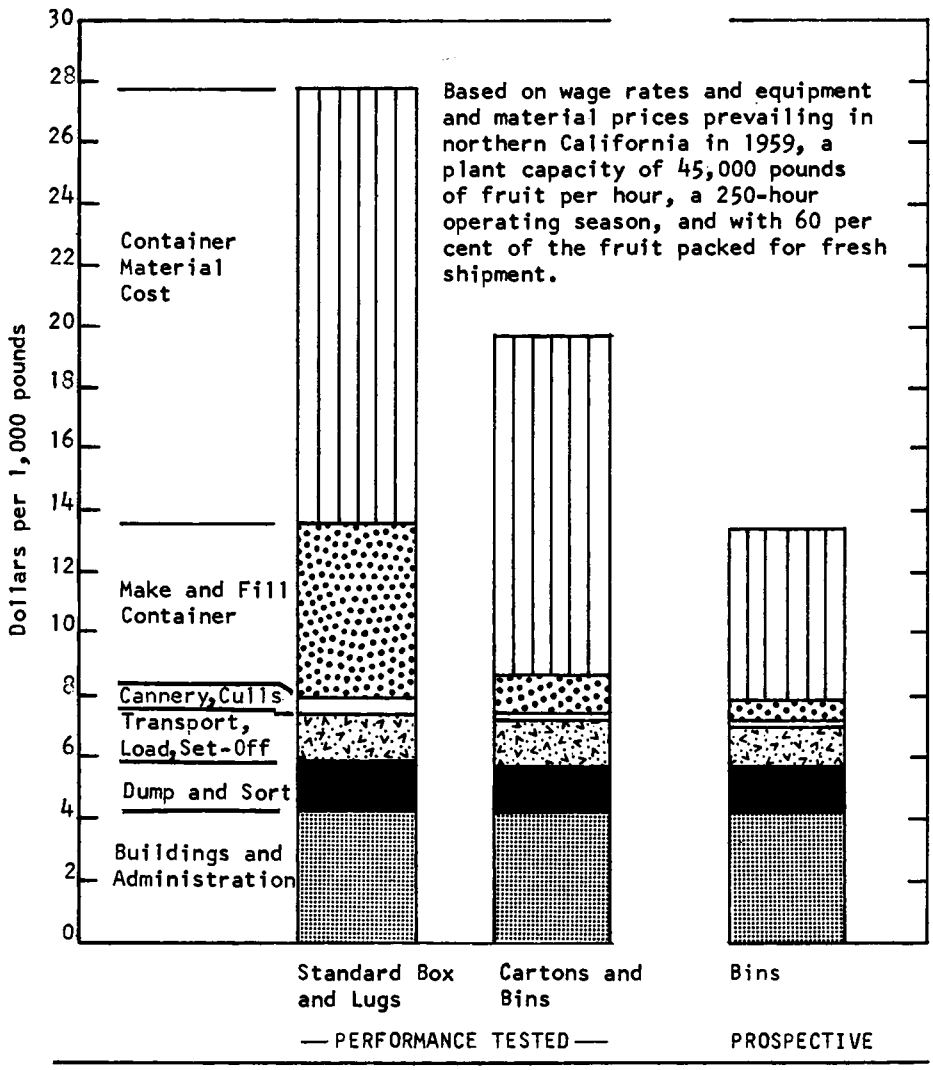
The new methods may be applied to several different types of fruit, but this report is concerned only with their effects on the packing of fresh pears. The cost comparisons used are restricted to packing house and loading costs; the costs of local assembly of field fruit, precooling and storage, and transportation to market are omitted.

Operations covered by the plant cost estimates begin with the receiving of field-run fruit. They continue with dumping the fruit on conveyors leading to grading and sizing equipment, and separation of the field-run fruit into several categories or grades. In pear packing, this process usually yields a fresh-market volume of 60 to 90 per cent of the fruit received. The remainder falls in other grades such as cannery and culls.

After grading and—for fresh-market fruit—sizing, the fruit in each grade is packaged. Packed fruit is normally palletized for movement to cold storage or to the truck or rail car used for shipment to fresh market. Cannery fruit is packaged in either lugs or bins and is loaded on cannery trucks with fork-lift equipment. Meanwhile, the clerical work required to determine the packout is performed. Additional operations covered by the cost estimates include in-plant transportation, and administrative and office clerical work.

Plant operations such as receiving and dumping incoming fruit, quality grading, and the packaging of cannery and cull fruit are independent of the packing method used. Packing operations for fresh shipment and the subsequent handling of packed fruit, however, differ considerably with the three types of shipping containers considered.

Different types of packing equipment used with wrap-and-place-pack methods include packing tubs, packing bins, and two-way packing belts. Among these alternatives, belt-type equipment was shown—through analysis of equipment investment and operating costs—to be the lowest cost method over the range of output rates and lengths of operating season common in California pear packing plants. Estimated costs were, therefore, based on this type of equipment. In oper-



Packing and container material costs in relation to type of assembly, shipping, and cannery container.

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141

ation, the belt-type equipment involves the circulation of a continuous flow of fruit through the packing area by means of conveyors. Size selection is performed by the packer as the fruit is removed from the belt and so no sizing equipment is required. Three types of container may be packed by this method: the 48-pound standard pear box; the 24-pound Los Angeles lug; and the 48-pound San Francisco lug. The cost data presented in this report assume that the fruit is place-packed in the standard box.

Bulk-packed cartons—commonly consisting of a full telescope fiber container of 36 pounds net weight—are filled automatically. The equipment required includes a drop or diverging roll sizer, carton filling units, and both carton and fruit conveyors. The fruit enters the sizer on closely spaced, transverse, metal rolls. As the fruit is carried through the sizer the roll spacing increases, allowing the fruit to drop in predetermined size categories. Generally, pears are packed in six different size categories. Cartons are fed to the filling stations by conveyor from the carton-forming area of the plant, automatically filled to a predetermined weight and ejected onto a packed-fruit conveyor. An empty carton automatically moves into the filling position as a full carton is ejected.

The pallet bin—for this study consisting of a double-walled non-returnable fiber container with an integral pallet base and corner posts of wooden construction — is of approximately 1,000 pounds net weight capacity. This type of bin has been successfully used in commercial shipments of pears to eastern processors. It has not, however, been tested in fresh-market shipments and the requirements—or even its feasibility—for such use have not been established. This study merely indicates the cost savings that could be realized by such a development for the movement of fresh pears to outlets capable of handling bulk shipments.

Top photo shows a test shipment of both the old and new style containers for fresh pears at an eastern market. Lower photo shows closeup of the new container.

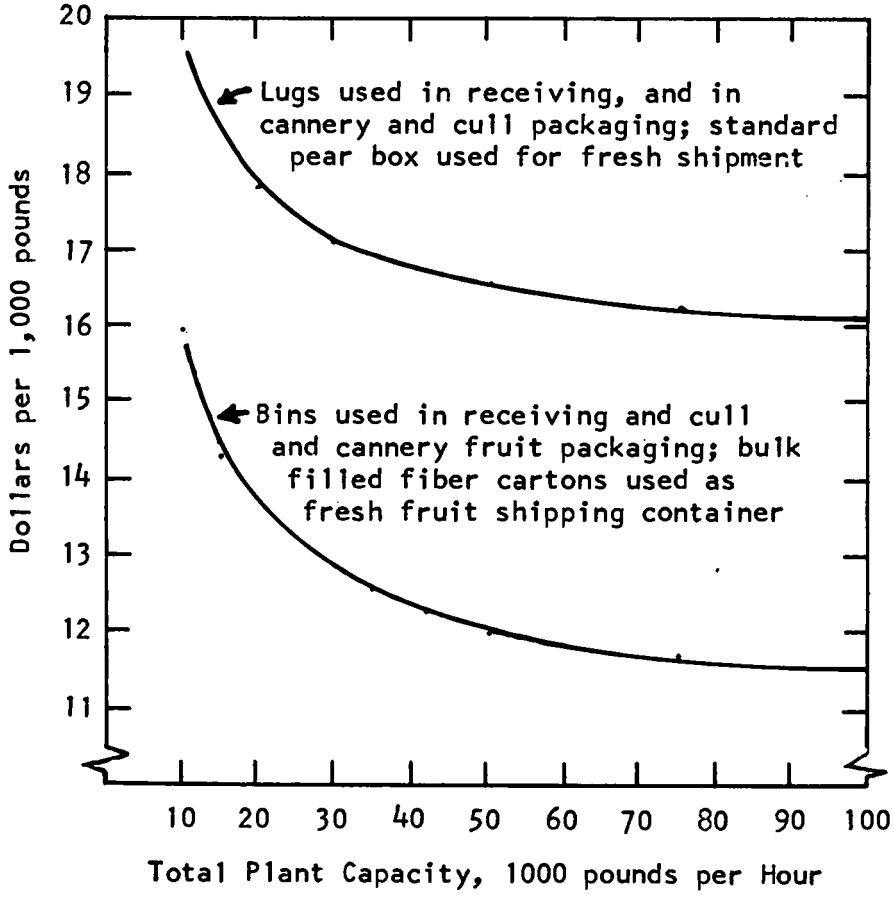
PLANT COSTS

Economic and engineering analyses were used to determine the least-cost method of performing the various plant operations with these alternative packing methods. Efficient plant organization with any particular method is assumed in the cost calculations. With the wrap-pack standard box and the bulk-filled carton the equipment, labor, and other services required were determined from studies of actual plant operations. The bin-type method has, however, had very limited use and so the cost estimates for it are based on an assumed plant layout. In all cases, the costs were based on estimated quantities of equipment, labor, electric power, fuel, container materials, and other services required, and on wage rates and prices prevailing in the Lake County region of California in 1959. Fixed investment costs, such as for equipment and buildings, were calculated on the basis of an annual charge that includes allowance for depreciation, interest on the investment, taxes, insurance, and fixed repairs.

While the 1959 cost rates used probably have moved upward with the general price level over the past two years, it is likely that relative values among the various cost categories have changed little. Hence, estimates developed with the earlier cost rates provide a reasonably good basis of cost comparison.

Estimated average total plant costs per 1,000 pounds of fruit packed with the three container types are shown in the graph on page 2.

Many different combinations of containers and packaging methods are possible, but only three are considered here: *1*, a plant which receives field fruit in lugs, place-packs in standard boxes, and uses lugs in the cannery and cull fruit packaging stage; *2*, a plant which receives fruit in bins, employs bulk-filled fiber cartons in the fresh-pack stage, and uses bins for cannery and cull fruit; and *3*, a plant which receives fruit in bins and packages both fresh-market fruit and cannery and cull fruit in bins.



Packinghouse cost in packing fresh pears in relation to plant capacity and packing container, California, 1959.

Estimated total combined plant and container material costs per 1,000 pounds of fruit packed are $27.84 with the wrap-and-place-pack pear box, $19.71 with the bulk-filled carton, and $13.51 with the bulk-filled pallet bin. If expressed in terms of a standard box equivalent these costs would amount respectively to $1.34, $0.94, and $0.65 per 48 pounds of fruit shipped. Per ton of fruit shipped, these costs range from approximately $55.00 per ton with the standard box to $39.00 with the fiber carton, and to $27.00 with the pallet bin. Compared with the standard box, a shift to the bulk-filled fiber carton would reduce costs by about $16.00 per ton, while a shift to the pallet bin would reduce costs by about $28.00 per ton. With returns to growers which range from $80.00 to $125.00 per ton, the potential savings with either type of bulk-filled container are considerable.

A major share of the range in cost shown with these different containers stems from differences in the costs of container materials. Most of the remainder of the savings result from lower labor costs with the bulk-fill packaging method.

While the potential cost savings available to California packers and shippers through the use of these new containers appear impressive, certain qualifications are necessary. High pallet-stacking of fiber boxes for extended cold storage involves small additional costs for supplemental supports. While not studied, these extra costs are probably more than offset by savings in the omission of car-stripping required with the standard box. Container design and fruit quality problems have not been completely solved for the bin-type shipping container, and many technical problems concerned with the handling and loading of the bins, both at shipping and receiving points, would need solution. With the pallet bin the magnitude of the potential market for fruit so packed is undetermined. With regard to either of the bulk-filled containers there is also the very important consideration as to prices received per ton shipped as compared with the standard box.

PLANT SIZE

The comparisons in this study focus on the effects variations in packing container would have on unit costs in plants of a given size. Another important consideration is the effect of plant capacity itself on costs. This is illustrated in the graph at left, where unit costs per 1,000 pounds of total plant output—shown on the vertical scale—are related to hourly plant capacity—shown on the horizontal scale. The upper curve in the diagram is based on the use of lugs in the dumping and cannery and cull fruit stages and place-packed boxes in the packing stage, while the lower curve is based on the use of bins in the dumping and cannery and cull fruit packaging stage, and bulk-filled cartons in the packing stage. The two curves are similar, although at different levels.

In the smaller range of plant sizes, unit costs decline rapidly as plant size is increased. For example, increasing plant capacity from 10,000 to 50,000 pounds per hour is estimated to reduce unit packing and container costs by 17% in place-pack plants, and by 25% in plants using bulk-filled cartons. Increasing plant capacity beyond 50,000 pounds per hour results in only minor cost reductions. The principal reasons for the decline in unit costs as plant capacity increases are the more complete utilization of certain large-capacity equipment units, and the consequent spreading of fixed charges, such as building and management costs, over a larger total output.

The results of the study indicate the possibility of substantial savings in the local costs of shipping fresh pears through utilization of new types of containers as well as the cost advantage of the large size plants. In many plants most of the gains from large capacity have already been attained. Wide adoption of the new containers depends, however, on the development of adequate markets and—in the case of the pallet bin—on the availability of suitable handling methods at both shipping and receiving points.

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