

Cartons for Lemon Shipments

open-top and sealed boxes of corrugated paper compared with standard boxes as to costs and fruit delivery

Roy J. Smith

A new type of corrugated carton, used for lemon shipments, saves from 34¢ to 45¢ per standard box.

Two types of cartons are in use, the open-top and the sealed box.

The open-top box is a modified Bliss-type box. Three-inch flaps from each side partly cover the top but are designed primarily to strengthen the sides. Handholes are provided at each end for easy handling. The boxes are assembled with the aid of a stitching machine.

The sealed box is a center special slotted container. The inner flaps and outer flaps, both top and bottom, nearly meet at the center of the box. A sealing machine is required; both top and bottom flaps are sealed after the box has been filled.

The sealed box is carried by the railroads, but under present conditions the open-top box is carried on the Pacific Coast only. Consequently the open-top box is limited to a relatively restricted market area.

The corrugated board used as material of the boxes is a duplex—two layers of paper laminated together with water-resistant glue. The same type of glue is used to attach the inner and outer liners. The board has adequate strength for stacking, high humidity from fruit and refrigeration does not affect it, and it is not subject to fatigue.

The boxes hold exactly one half of the fruit in a standard box. Dimensions are used in which a perfect pattern count can be found for every important size count of the standard box.

The sealed box can be loaded in a refrigerator car of common width—99"—and have a perfect fit. Other car widths can be adjusted for by other box patterns in the car.

Present inside box dimensions—not considered final—are 16 $\frac{3}{8}$ " long, 11" wide, and 10" high. The sealed box is very rigid in its volume requirements; failure to achieve a flat fill within narrow limits prevents the sealing machine from properly gluing the flaps shut.

The material cost at open market prices of the standard fullwrap 360 pack is about 76¢.

The cost of two open-top cardboard boxes delivered is 26¢. Labor cost of assembling two is not more than 3¢. With all projected changes that might be made,



The two types of cartons in use. Above, the open-top box; below, the sealed box.



the total cost of two boxes will not exceed 31¢. The stitcher costs about \$400.

Two sealed boxes cost 42¢. The automatic gluing and compression machines cost about \$4,800.

The prices on both types of corrugated boxes are on a delivered basis and include a two-color print.

The direct savings of the open-top boxes are 45¢ per standard box. In using the sealed box the saving is 34¢.

In addition the sealed boxes reduce rail freight charges over 6¢ per standard box depending on how heavy a fill was used for the old box. The new box is lighter and is not classified at a higher weight than the actual shipment weight as is the case with the standard box.

The material cost—for shook and nails—of lemons sold loose in the local market is over 53¢. Two open-top cartons with no identifying brands can be made available for 29¢ and will hold 70 pounds of fruit loose. The standard box loose will hold only about 56 pounds. The fruit weight difference gives the new box a great advantage; the equivalent cost of the new box for 56 pounds of fruit is 23.2¢, compared with the 53¢ for the standard box.

Second-hand boxes are used occasionally for loose sales in lemons. The last such purchase for which a record is available was for 32¢—a cost far greater than the equivalent 23.2¢ for the new open-top box.

A complicating factor in this cost analysis is that the standard shipping box is also used for storage. It is doubtful if the new box can be so used. However, the immediate savings from the use of the new boxes will compensate for having different boxes for the two uses.

The use of the corrugated boxes rests not only on relative costs but also on certain technical storage and shipping methods.

Trial shipments in open-top boxes were initiated for three reasons: First, it was the cheapest available—cheap enough, if necessary, to overcome some losses in fruit price and quality. Second, the box offered good ventilation. Third, in the market area to be reached by truck there was little time for spoilage.

The sealed box is being shipped throughout eastern United States. Ventilation is limited and there is time for decay. A thoroughgoing test is underway as to the validity of traditional concepts in shipping lemons.

There are two basic questions on ventilation: one relates to temperature control, the other to the evolution of gases by the fruit.

Lemons offer a favorable opportunity in temperature control: they are graded and packed at their ideal storage temperature, and all that is needed for refrigeration is the maintenance of temperature levels. The insulating characteristics of corrugated board may actually be beneficial as they tend to stabilize temperatures.

No specific information is available as to the effect of the new box on fruit respiration and the escape of gases. One feature of decay control is that the sealed boxes are coated inside with a fungistatic material. It is a diphenol compound masked to reduce odor. To be effective it requires that the box be reasonably tight.

Trade reaction to the new boxes has been favorable. Retail stores that tried them, consistently reorder. In the local citrus auction where the new open-top carton has been available every day since

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REVOLVING

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of certificates are lost and that frequently the wrong certificates are returned for payment. To avoid delay, confusion and unnecessary expense, book credits are being used. A statement is mailed to each member showing changes in his account during the year, and its status at the year's end adequately serves the purpose of a certificate.

Intermember Adjustments

There are several plans by which western associations transfer investments from members in need of money to those with money to invest. One such plan has been in operation for over 20 years. These plans are a step in the direction of making revolving finance more popular among farmers, particularly those who are getting started in the business of farming and are short of capital.

Giving revolving fund credits negotiability touches two other problems. One concerns the extent to which an association considers revolving finance funds as security when it extends credit to members. Obviously, an association which extends credit to its members must protect itself in any plan to transfer revolving fund credits. For example, the bylaws may give the association a prior lien on all revolving funds to cover any indebtedness of the members.

A second point concerns the matter of paying interest. Revolving fund credits bearing approximately current interest rates are likely to be salable at something like par. In cases where no plan has been worked out to facilitate such transfers, needy members must sometimes assign accounts at heavy discounts.

Risk Aspects

Co-operatives face many of the same risks as other types of business. Associations which derive their revolving capital from stated percentage deductions from proceeds may find themselves short of funds in years of low prices. On the other hand, a flat deduction—say 1¢ per dozen eggs—may seem burdensome to producers with eggs at 20¢ a dozen, equivalent to 5%, but be negligible with prices at 75¢, equivalent to $\frac{2}{3}$ of 1%. Associations which revolve capital out of savings will find that savings vary from year to year. Decreased savings may require such lengthening of revolving periods as to cause trouble under fixed maturity plans.

Another sort of risk concerns equities after violent price level changes, particularly in case of dissolution and liquidation when articles and bylaws have not been carefully drawn. In times of significant inflation some well-established co-

operatives could pay off all revolving funds and have a large amount of money left. Bylaws could allot such a residual to the stockholders in case of liquidation and not to those who contributed most of it.

Co-operatives, like other businesses, set up reserves for numerous purposes. Recently there has been a tendency to set these up as revolving funds. Some of these so-called reserves are more in the nature of risk capital and should perhaps be so treated. In that case they might be revolved, perhaps on a book value basis.

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ORANGE

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over the 22 years of the experiment was detrimental to the structure of the soil, causing a marked deterioration of tree condition and yields. However, when these fertilizers were used with manure in such a manner that the manure supplied one half of the nitrogen, harmful effects did not occur and the yields were not depressed. When soil conditions are such that the continuous use of these fertilizers is harmful, organic matter supplements appear to be particularly desirable.

In these treatments dairy or steer manure from fattening yards was used. Other treatments with manure, alfalfa hay, cereal straw or lima bean straw indicate that these have equally good effects on yields if equal quantities of organic matter are applied and their use is supplemented with nitrogen fertilizers to reach the same total quantity of nitrogen. The most important consideration in the use of different bulky sources of organic matter appears to be the ratio of the amount of organic matter to the amount of nitrogen—from all sources—applied annually. In the most productive treatments this ratio has been close to 20 to one. This is equivalent to a carbon-nitrogen ratio of about 10 to one.

Fruit Size and Grade

The use of covercrops—with chemical sources of nitrogen—caused a small increase in the size of the fruit. Larger increases resulted from the use of manure.

The effects of organic matter from covercrops and manure on fruit size appear to be due to two factors. One is their beneficial effect on soil structure and the infiltration of water; the other is the effect of applied organic matter upon the supply of potassium which affects fruit size.

The grade of the fruit was not appreci-

ably affected by the growing of covercrops or the use of manure. However, these factors slightly affected the internal quality of the fruit. In general, manure appeared to act very much like a potash fertilizer and made the juice slightly more acid.

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The above progress report is a summary of part of the results of a long-term experiment at the Citrus Experiment Station at Riverside. The full report is available as Bulletin 722 of the California Agricultural Experiment Station.

POTATO

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about 6° F, the average 4° F. This was true in early April when the foliage gave only partial cover to the bed, as well as in late May when the foliage almost completely shaded the ground.

Records were obtained from irrigated and nonirrigated fallow beds. Water was first applied to the irrigated beds on April 17, after which they received daily irrigations in alternate furrows. Temperatures obtained at the 6" depth show that, during late April, soil of the irrigated bed was on the average approximately 2° F cooler than that of the nonirrigated beds. During May, the difference was approximately 3° F, and near the end of the test, in June, the irrigated beds were approximately 4° F cooler. It appeared that the higher the air temperature the greater was the degree of cooling of the soil by irrigation. It would seem that growers planting potatoes in this soil at the 6" depth during periods of high temperature might expect a cooling of approximately 4° F, or possibly slightly more, in irrigated as contrasted with a dry soil.

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April 2, a premium has been paid for the new box over the old, often amounting to 25¢ per standard box.

Retail markets gain from the one-half box carton. Many stores find the old box uneconomical because of its size. Decay and shrinkage become serious before all the fruit is sold. The new boxes are lighter to handle and, when empty, can be used as consumer tote box.

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