

# **COST AND EFFICIENCY STUDIES IN MARKETING OREGON PEARS**

## **II. Labor Requirements of Different Methods Of Packing Pears in Polyethylene**

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LABOR REQUIREMENTS OF DIFFERENT METHODS  
OF PACKING PEARS IN POLYETHYLENE

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Polyethylene liners were used commercially in packing winter pears for the first time in 1953. Their ability to maintain quality and increase storage and shelf life of the fruit has resulted in a tremendous increase in use since that time. Almost 65 per cent of the 1956 winter pear crop from the Pacific Coast states was packed in the lined boxes. In Oregon, over 75 per cent was packed in this manner.

The use of the liner has resulted in the consumers being offered a better product. Buyers, as a consequence, have been willing to pay substantial premiums for liner-packed pears. During March of the 1955-56 marketing season, this premium at the New York auction for Medford Anjou pears generally ranged from 50 cents to a dollar per box.<sup>2</sup>

To take advantage of this premium, the packer must increase his cost of operation. Additional costs above normal packing costs would include the cost of (1) liner materials, (2) labor and equipment for handling the liner, and (3) any reduction of plant capacity resulting from the use of polyethylene. Although these costs are a small proportion of total packing costs, they amount to a substantial sum when a high percentage of the fruit is packed in polyethylene.

The rapid increase in the use of polyethylene found packers using several different methods of handling the liners. The pear industry requested that a study be made of the relative efficiency of the different methods being used for the 1955 crop. The purpose of the study was to indicate cost-reducing features that could be incorporated into packing operations. As a result, polyethylene handling operations were studied in 8 packing houses in the Medford and Hood River-producing areas during the 1955 packing season.

Lining the Box

Two methods of lining the box were in general usage in the industry, (a) lining for the packer, and (b) lining by the packer.

Lining for the packer consists of fitting the liner into the box before it reaches the packing station. Usually this is done immediately after the box leaves the boxmaker but before the box is transferred to the packing line by chute or overhead monorail. The only required packer-handling of the liner is to adjust it during the packing operation.

The other general method--lining by the packer--consists of two phases. Usually the liner is shaken out to separate its sides and then inserted, but not positioned in the box. This is done before the packer receives the empty

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<sup>2</sup>H. M. Hutchings and G. B. Davis, Price Differentials Between Polyethylene and Standard Pack Anjou Pears, Oregon Agricultural Experiment Station Miscellaneous Paper 40, April, 1957.

box. Then the packer does the actual positioning of the liner before placing fruit in the box. A premium is paid for this additional work. The packer adjusts the liner as necessary during the packing operation.

Labor requirements were lower in the plants lining for the packer. (Table 1) All but one of the plants lining for the packer used less labor per packed box than the plants in which the packer lined the box.

Table 1. Labor Used in Lining Pear Boxes  
With Polyethylene<sup>1</sup>  
(Medford and Hood River, Oregon, 1955)

Operation	Method of Lining							
	Box lined for packer					Packer lines box		
	Plant 1	Plant 2	Plant 3	Plant 4	Plant 5	Plant 6	Plant 7	Plant 8
	(man minutes per box) <sup>2</sup>					(man min. per box) <sup>2</sup>		
Preparing poly for lining	-	-	-	-	-	.24	.35	.16
Lining	.79	.37	.47	.50	.28	.36	.36	.36
Adjusting by packer	.08	.08	.08	.08	.08	.08	.08	.08
Total poly time	.87	.45	.55	.58	.36	.68	.79	.60

In lining for the packer, each plant had a different method of inserting the bag. For example, two of the plants did it by hand and used no mechanical device. Three plants had a mechanical form or mandrel. Plant number 5, using a mandrel, had the lowest labor requirements (See pictures) This particular operation was well suited to the labor and layout of that plant. Adaptations of this method have been made in several other packing plants since this study was made. This method, of course, might not fit into other plants quite as well because of differences in plant layout, available labor, and plant capacity.

Letting the packer line the box may reduce daily plant capacity when compared with the other method. The packer's time spent in inserting the liner and adjusting it during packing uses 8 to 16 per cent of the time available for actual fruit packing. The variation in time lost depends on the size of fruit being packed. The smaller the size of fruit, the smaller percentage of time lost due to the liner. Volume can be maintained by employing additional packers if they are available and if there is enough packing space to use them effectively. When additional packers are not added, plant output is reduced in the manner shown in Table 2. About four additional packers would be required to bring daily output for the medium size "packer lining" plant up to the level of the same sized plant "lining for the packer".

<sup>1</sup>All labor information obtained by time and production studies made while plants were operating at capacity.

<sup>2</sup>Includes a 20 per cent allowance for normal delay and rest periods.

Table 2. Estimated Daily Plant Output as Affected by Polyethylene Lining Methods

Method of Lining	Size of plant--estimated daily output of unlined boxes of fruit <sup>1</sup>		
	2500	5000	7500
	(boxes per day)		
Lining for packer	2451	4902	7352
Packer lining	2260	4520	6779

When daily plant capacity is reduced, the costs per unit of daily output tend to rise. Labor paid by the hour often cannot be reduced in proportion to a decrease in daily output. This contributes to higher labor costs per box.

Lining for the packer also can reduce daily output when compared to packing without the liner. Packers spend a small amount of time, about .08 minutes per box, adjusting the polyethylene during packing. This, however, has only a small effect on the packer's daily output.

#### Closing the Liner

It is important to close the liner properly if the benefits of the polyethylene are realized. In actual practice, the liner is closed either with or without the air first being exhausted. From the standpoint of maintaining quality and increasing storage and shelf life, the question of whether one is a better method than the other is a matter outside the scope of this study.

Plants that remove the air do so by using either a conventional home vacuum cleaner or a commercial suction machine. The latter is commonly used in packaging other agricultural products, especially poultry. Exhausting the air causes the liner to fit the contour of the outer layers of the fruit pack, thereby preventing any part of the bag from protruding outside the box. The liner then is sealed with a wire tie or adhesive tape.

In plants not exhausting the air, the bag is closed by folding the top of the liner and either placing a pear on top of the fold or loosely taping the fold. Usually this type of seal permits some of the liner to protrude between the box sides and the lid and bottom. This is true especially after lidding. Some plants have two people tuck the protruded liner back into the box after lidding. This prevents the liner from being torn in subsequent handling.

Exhausting the liner used less labor than closing by hand and tucking the liner (Table 3). The operation of tucking added considerably to the labor requirements of closing by hand.

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<sup>1</sup>This assumes that no additional packers will be added to the crew and only size 120 fruit is being packed.

Table 3. Average Labor Used to Close Polyethylene Liners in Winter Pear Packing Plants (Medford and Hood River, Oregon, 1955)

Operation	Method of closing liner <sup>1</sup>	
	Exhaust and seal	Close by hand
Exhaust and seal	.46	--
Close by hand	--	.32
Tuck liner	--	.24
Total Poly Time	.46	.56

In addition to labor in closing, additional work is involved in burning or punching holes in the polyethylene after the box is lidded but before it goes into storage. This operation has been added since this study was made. It is a direct result of research designed to prevent certain storage disorders that develop in liner-packed pears.<sup>2</sup> The holes punched or burned in the liner prevent the buildup of too high a concentration of carbon dioxide gas.

<sup>1</sup>Includes a 20 per cent allowance for normal delays and rest periods.

<sup>2</sup>W. M. Mellenthin and Elmer Hansen, Pear Storage Tests with Poly Bags, Annual Report, Northwest Perishable Loss Prevention Short Course, 1957. Elmer Hansen, Reactions of Anjou Pears to Carbon Dioxide and Oxygen Content of the Storage Atmosphere. Proceedings of the American Society of Horticultural Science. 69. 1957.

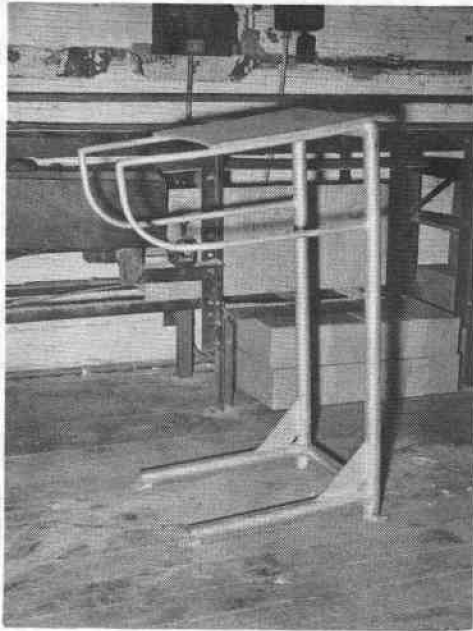


Figure 1. Mandrel is constructed of smooth, welded tubing.



Figure 2. Worker at right is fitting liner on mandrel. Other member of 2-man team is stockpiling a lined box.

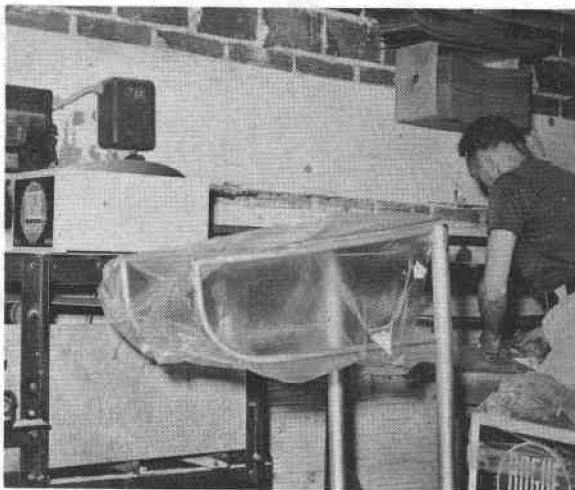


Figure 3. Liner has been pulled over mandrel. Worker at left will slip empty box over mandrel and liner. Top of liner is then folded back over side of box.

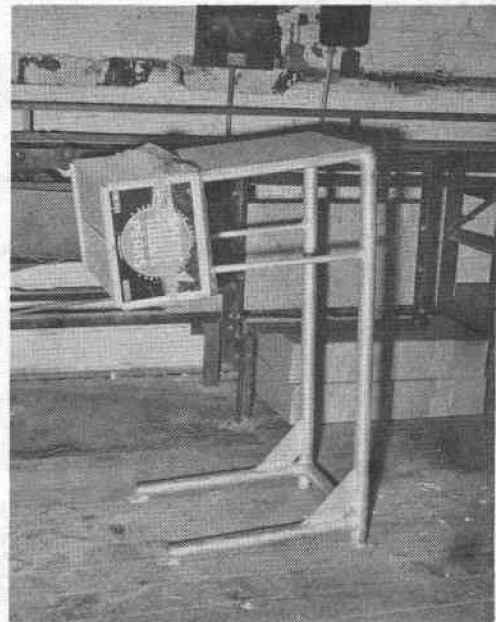


Figure 4. Box has been lined and is ready for removal from mandrel.