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Using Packinghouse Records To Evaluate Your Orchard's Financial Performance

Farm Business Management Reports

USING PACKINGHOUSE RECORDS TO EVALUATE YOUR ORCHARD'S FINANCIAL PERFORMANCE

By

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INTRODUCTION

Most orchards consist of one or more crops, several varieties and strains planted in different blocks and fields, and of varying tree ages and conditions. Imposed on each of these situations is a complex series of production practices designed to produce large volumes of quality fruit.

Invariably, the crop on the tree looks quite different than in the bin. Watching the fruit being sorted for color and defects and then sized, gives yet another impression. The bottom line comes with the summary of packout and returns given to the owner by the packinghouse. These reports emphasize how sophisticated the market has become. Heavy price discounts for poor color and small sizes demonstrate the lack of tolerance by the market for a complex biological system.

Correct interpretation of packout records is the first step in evaluating the economic performance of an orchard. When properly summarized, they provide a detailed appraisal of orchard performance. Problem areas in the orchard can be identified and corrected.

WHAT PACKINGHOUSE RECORDS SHOW

Packinghouse records contain a variety of information. The presentation and the format of the packinghouse record differs from one firm to the next. Yet, the same basic information is provided by every firm.

In general, there are two sets of data in each record. One set of data describes the physical characteristics of the fruit. These characteristics include volume of fruit, grade, and size.

The other set of data in the records covers the financial aspects associated with the marketing of the fruit. F.O.B. prices are shown for each size and grade. Packinghouse and industry charges are also detailed. These charges make up the difference between the F.O.B. price and the packinghouse door return.1/

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1/ F.O.B. means "Free on Board," It is the price received by the packinghouse per unit of fruit. Packinghouse door returns represent grower returns.

PHYSICAL CHARACTERISTICS

Packinghouse records contain four types of physical information. These types of information include quantity, grade, size, and several percentages dealing with grade relationships and packed box to field box relationships. Each provides a different way to evaluate the crop.

1. Quantity of Fruit.

Typically, the first entry on the packinghouse record will be the amount of fruit delivered. The quantity of fruit delivered can be measured in at least three ways. The most accurate method is weight. When fruit is weighed, both the grower and the packer know exactly how much fruit has been delivered.

When bins are emptied in water dumps, allowances must be made for the water-soaked bins. Another disadvantage to weighing is the conversion necessary to evaluate yield. Yield measurements are usually expressed in either field boxes or bins.

Number of bins or number of field boxes delivered are the most common methods used to determine quantity of fruit delivered. Size of field box or bin used is required to determine production per acre. In addition, the amount of fruit that a given sized field box will hold depends on the variety as well as the kind of fruit. Two common field box weights for Red Delicious are 33 lbs. per box and 35 lbs. per box.

A similar situation occurs with bin size. Although not quite as dramatic as the effect of field box size, the differences between bins can be economically significant. Packinghouses using 35 lb. field boxes will have bins that hold 25 field boxes (875 lbs.). Bins based on the 33 lb. field box will hold 26 field boxes (858 lbs.).

The numerical examples presented later in the text use weight as the basis for the examples. The returns per acre are calculated using 35 lb. field boxes. Readers interested in analyzing their own production should convert production to pounds per acre. When comparing returns per acre, yield in pounds can be divided by 35 to get field box equivalents.

Quantity of fruit delivered to the packinghouse represents the production of the orchard. Production per acre can be determined by dividing total production by the number of acres. The only valid comparisons that can be made of yield information is between years where field box size has not changed, or, between growers who use the same field boxes or bins. General use of yield figures without specifying size of field boxes can be misleading.

2. Grade.

Packout records also contain information on the grade of fruit delivered to the packinghouse. Grade is a key determinant of grower

returns. Extra fancy, or top, grade receives the best price per packed box; lower grades are discounted. Two prominent factors that cause fruit to be downgraded from extra fancy to fancy are color and shape. According to U.S. grade standards, red sport varieties must be at least 66 % red to make extra fancy and 40% red to make fancy grade.[2/] Striped varieties must be 50% and 25% red to make extra fancy and fancy grades, respectively. Both grades require fruit that is fairly well formed. Culled fruit, being unsuitable for the fresh market, are usually processed and receive the lowest returns.

a. Culls.

Culled apples may be sorted into two classifications--peelers and juicers. Juicers are apples that are very small or are seriously blemished. Peelers are fruit that do not make fresh market grade because of the lack of color or have surface blemishes that can be eliminated by peeling with minimal fruit loss. If these fruit have suitable size they can be processed into canned apples, applesauce, fruit cocktail, etc. However, sorting peelers may require additional equipment in the packinghouse. Since peelers must be kept separate from the juicers, an additional bin filler or accumulation flume may be needed. In the case of bin fillers, belts are needed to move the fruit from the grading table to the filler.

Some packout records indicate the principal causes of cullage. If cullage is excessive, then this information is useful in identifying necessary changes in production practices.

Because of the price differential between the fresh and processing markets, the effect of excessive cullage on grower returns can be substantial. As a general rule of thumb, cullage of red cultivars and super red sports should be around 10%. Cullage of yellow cultivars should average about 15%. See Appendix Table 2 for suggested guidelines.

The following example shows the economic importance of maintaining the proper amount of cullage. Two orchard blocks, each have an acre of Red Delicious apples that grade according to the percentages in Table 1. Although both blocks have the same percent packout of extra fancy fruit, Block A actually has 15% more fruit in extra fancy grade and 5% more fruit grading fancy than Block B.[3/] The difference in both cases is Block B's higher cullage.

2/ USDA, AMS. United States Standards for Grades of Apples.

3/ Percent packout is determined by the number of packed boxes only and does not consider the amount of cullage.

Table 1: Relation of Packout to Cullage Rates.

	% of Packed Boxes		% of Production	
	Block A	Block B	Block A	Block B
Extra Fancy	75	75	67.5	52.5
Fancy	25	25	22.5	17.5
Culls			10.0	30.0
	100	100	100	100

Table 2 shows the economic impact of excessive cullage using prices from February, 1981, and packed boxes containing 42 lbs. of fruit each. The figures are based on a yield of 1,000 field boxes, Block A has only 10% cullage, and yields 750 packed boxes per acre. Block B has 583 packed boxes per acre, 167 fewer packed boxes than Block A.

In addition to the difference in returns between Blocks A and B, there is also a difference in the handling costs. A common method of assessing charges by packinghouses is to have an in-charge per bin plus a charge for each box of fruit packed. Since Block B has fewer packed boxes, there will be lower total handling charges, but higher charges per packed box for the fruit from that block. Only after deducting handling and packing charges do we get an accurate picture of the effects of cullage. In this particular case, the difference in receipts per acre to the growers is $652.89. Other yields or cullage rates would give other differences in receipts. Also, other methods of assessing packing charges would change the results.

An average effect of the cullage rate can be calculated from Table 2. Dividing the difference in returns ($652.89) by the difference in cullage percentages (20%) indicates that each percentage point reduction in the cullage rate increased grower returns by about $33 per acre. A grower who was able to reduce cullage by 5 percentage points, i.e., from 15% to 10%, would increase receipts by $165 per acre.

Table 2: Packout, Cullage, and Returns in 1982[a/]

	Block A		Block B	
XF @ $8.89/pack	563 packs	$5,005.07	438 packs	$3,893.82
F @ $6.89/pack	187 packs	1,288.43	145 packs	999.05
Culls @ 3¢/lb.	3,500 lbs.	105.00	10,500 lbs.	315.00
Total F.O.B. Returns		$6,398.50		$5,207.87
Packing Costs[b/]		$3,215.00		$2,677.26
Grower Receipts		$3,183.50		$2,530.61
	Difference in Receipts		$652.89	

a/ Assumes yield of 1,000 field boxes.

b/ $20 per bin in-charge plus $3.22 per packed box.

Note also that, unless a packinghouse has an electronic color sorter, almost half of the fruit (culls plus fancy grade) from Block B must be physically handled as it goes over the grading tables. The handling of such a high percentage of fruit will undoubtedly increase the cost to the packinghouse of handling that fruit. Continued production of low quality fruit could cause the owner of Block B to either pay higher packing charges or have trouble maintaining working agreements with packers.

b. Effects of Distribution Between Grades.

Just as important to returns is the distribution of income between the fresh market grades, fancy and extra fancy. Again, take two orchard blocks A and B. Table 3 shows the packout distribution between Block A and Block B. Based on percent packout, two-thirds of Block A's fruit grades out extra fancy whereas 90% of Block B's fruit is in the top grade. In terms of total production per acre, Block B has 21% more of its fruit in the extra fancy grade, while Block A has 21% more fancy grade fruit. The 21% comes from the difference in the percent of production grading extra fancy (81% - 60%). Both blocks have the same cullage.

Table 3: Effect of Grade on Returns.

	% Packed Boxes		% of Production	
	Block A	Block B	Block A	Block B
Extra Fancy	67	90	60	81
Fancy	33	10	30	9
Culls			10	10
	100	100	100	100
Ave. F.O.B. Price/Packed Box			$ 8.60	$ 9.09
Culls $/Ton			$60.00	$60.00

Net returns per acre are listed in Table 4 using the prices in Table 3. These returns have had handling and packing costs deducted. Prices were based on Washington Growers Clearinghouse reports from February, 1981. Size distribution of the fruit was assumed the same for both growers.

The average value for each additional percentage point of extra fancy fruit can also be calculated. Dividing the figures in the difference column in Table 4 by the 21% difference in extra fancy production gives the average dollar value per acre for each additional percentage point. The average value per percentage point ranges from $13 to $22 with the value increasing as yield increases. Increasing the proportion of extra fancy fruit by 5 percentage points is worth $65 to $110 per acre depending on yield per acre.

Table 4: Net Receipts per Acre for Grade--1981.

Yield Field Boxes	Block A $	Block B $	Difference $
750	2,507	2,784	277
1,000	3,340	3,708	368
1,250	4,178	4,637	469

Value per Percentage Point ranges from $13 to $22.

Note that these average values are based on the change in total production per acre meeting extra fancy standards. The use of percent packout to determine the average values would give slightly lower figures.

Appendix Table 2contains suggested guidelines for optimum levels of grade and cullage. These guidelines are based on a forthcoming publication by R. B. Tukey.[4/] They represent realistic goals for most producers in Washington's commercial apple producing areas. The guidelines take into consideration the horticultural effects of overemphasizing any particular factor, such as size, color, or yield. Comparison of these guidelines with actual production will help the grower determine the amount of improvement one can reasonably achieve in terms of grade and cullage.

3. Size.

The size distribution of packed fruit is also listed in the packout record. The amount of fruit in each size category is indicated by the number of packed boxes. In addition, the amount of small fruit shipped in bags or loose in boxes is also listed.

Fruit shipped in bags or loose in boxes will be indicated by the diameter of the individual fruit. Traypack cartons are shown in terms of the number of fruit per carton.

The effect of size on returns is not often considered explicitly. Yet, the difference in returns generated by size alone can determine the profitability of an orchard in an accounting as well as an economic sense. Weather, and age of an orchard as well as past cultural practices can reduce fruit size; however, the negative effects of these factors can be minimized through appropriate cultural practices.

Evaluating the effect of size on returns requires holding yield and fresh packout constant. It is done here to measure the effect of size without the influence of yield and packout. In reality, it is not possible to completely separate size from yield and packout.

Table 6 contains three size distributions as examples. These are actual packout records for Red Delicious. Each distribution peaks on

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4/ Tukey, R. B., Evaluating Orchard Performance and Practices from Packout Records, Cooperative Extension, Washington State University. Work in progress.

a different size. Block A peaks on size 125 and 69% of the fruit are smaller than size 113. Block B fruit peaks on 100s. Two-thirds of this fruit are smaller than size 100. Block C, on the other hand, produces fruit, 44% of which are size 100 and larger.

Each block yields 1,000 field boxes per acre. Ten percent of the fruit are culled. In terms of percent packout, each block yields 75% extra fancy and 25% fancy. Based on total production, 67.5% is extra fancy and 22.5% fancy grade. The distribution by grade for each block is the same as Block A in the cullage example.

Table 5: Size Distributions and Prices*/

	Block A	Block B	Block C	Weighted Prices
	%	%	%	$
2's/lgr		2.0	3.4	8.75
80/88	5.1	13.5	19.3	10.71
100	9.1	16.8	22.4	9.66
113	16.1	21.0	20.6	8.84
125	25.3	16.1	15.4	8.29
138	24.0	16.5	9.8	8.10
150's/sml.	20.3	14.1	9.1	6.95

*/ Size distributions are actual data; prices obtained from Washington Growers Clearinghouse Reports, February 1981.

The prices in Table 5 have been weighted for the grade effect (i.e., fancy and extra fancy). These are Red Delicious prices. The price for each size was calculated by the following formula:

Weighted Price = [(.75)x (Extra Fancy Price)]+[(.25)x(Fancy Price)]

The numbers .75 and .25 are adjustment factors (weights) for the amount of fruit in each grade. They are the percent packout for each grade divided by 100. The average F.O.B. price per packed box is calculated by multiplying the percent of fruit in each size category by the corresponding price. All of these multiplications are added and the sum is divided by 100 to get average price.

Table 6 shows the returns of each grower given the size distributions and prices in Table 5. These returns have handling and packing charges deducted. The packinghouse charges assessed at each yield level are the same for all three growers. The number of bins delivered and the number of boxes packed are the same for each grower at each yield.

Table 7 shows the difference in grower receipts caused by peaking on different fruit size. These figures are the differences in returns shown in Table 7. Even at low level of production, Block A could generate another $253 per acre by increasing peak size from 125s to

113s. In going from 113s to 100s, Block A would gain another $169. The overall difference between peaking on 125s and 100s is over $420 per acre.

Since the prices used here are from the 1980 crop year, it indicates that good size increases returns even when the Washington crop has good overall size. The difference in returns is even greater when the crop has small size.

Guidelines have been published indicating the optimum size distribution for Red Delicious.[5/] Bartram suggests that the desired size distribution of fruit in terms of packed boxes is 40% 88s and larger, 40% 100s and 113s, with the remainder being 125s and smaller.

Similar guidelines for several different cultivars are provided in Appendix Table 3. From an economic perspective, small fruit are more damaging to a grower than extremely large fruit. Prices for very large fruit are often discounted relative to the more popular fruit sizes. However, the amount of discount on large fruit prices is seldom, if ever, as great as the discount associated with small fruit. Therefore, growers should be primarily concerned with reducing the volume of small fruit.

Table 6: Effect of Fruit Size on Grower Receipts per Acre by Yield Level.

Yield (field boxes)	Block A $	Block B $	Block C $
750	2,339	2,592	2,761
1,000	3,115	3,453	3,678
1,250	3,896	4,313	4,600

Table 7: Difference in Grower Receipts per Acre Caused by Fruit Size.

Yield Field Boxes/Ac.	A-B $	B-C $	A-C $
750	253	169	422
1,000	338	225	563
1,250	417	287	704

5/ See Bartram, Dick, "Panel-Growing Red Delicious Apples of the Desired Size and Shape in Washington," Proceedings, 1981, Washington State Horticultural Association, pp. 32-36.

4. Commonly Used Percentages.

Several percentages are commonly used within the apple industry. Among the ratios are percent cullage, percent extra fancy, and percent packout. One or more of these may be listed on the packout record. In the examples that follow,, all calculations are based on 35 lb. field boxes and 42 lb. packed boxes. Growers making their calculations should be sure to use the weights for field boxes and packed boxes appropriate for their operation.

a. Percent Cullage.

There is considerable significance associated with percent cullage. As cullage increases, grower receipts decline. This point has already been adequately emphasized.

Percent cullage is usually determined by dividing the amount of culls by the total amount of fruit and multiplying by 100. The amount of culls and total fruit can be measured in pounds or field boxes. The following formula is an example of that calculation.

$$\% \text{ Cullage} = \frac{\text{lbs. culls/ac.}}{\text{lbs. fruit/ac.}} \times 100$$

b. Percent Extra Fancy.

Another common figure is percent extra fancy. This ratio is determined by dividing the number of packed boxes of extra fancy fruit by the total number of packed boxes.

$$\% \text{ XF} = \frac{\text{No. of packed boxes XF fruit}}{\text{Total no. of packed boxes}} \times 100$$

It indicates the amount of fresh market quality fruit that is in the highest grade. It does not provide a measure of the quality of the orchard because it omits the effect of cullage. An orchard producing 50% culls and 90% extra fancy generates much lower returns than an orchard with 10% culls and 75% extra fancy. Out of total production, the first orchard is yielding only 45% extra fancy (50% x 90%). The second orchard is yielding 67.5% extra fancy (90% x 75%).

c. Percent Packout.

A third percentage is percent packout. There are two methods of calculating this figure. One way to calculate percent packout is to divide the number of packed boxes by the total number of field boxes.

$$\% \text{ packout} = \frac{\text{No. of packed boxes}}{\text{Total no. of field boxes}} \times 100$$

This method is influenced by both the weight of the packed boxes and the weight of fruit in field boxes. The maximum percent packout using 33 lb. field boxes and allowing 10% cullage is approximately 73%. As long as the field boxes all contain 35 lbs. of fruit and each packed box has 42 lbs. of fruit, the maximum percentage is 83%. This assumes

no cullage. Allowing for 10% cullage, a reasonable maximum for percent packout is 73%.

The other common method of calculating percent packout is as follows:

$$\% \text{ packout} = \frac{\text{No. of packed boxes}}{\text{Total field boxes-field boxes of culls}} \times 100$$

All growers whose fruit is packed in 42 lb. cartons and use 35 lb. field boxes will have a percent packout of about 83%, regardless of cullage. The second percent packout formula is equivalent to dividing field box weight by packed box weight.

The first percent packout formula yields a better description of the amount of fresh market grade fruit in a given block. The effect of cullage is included in the first formula because the denominator includes total orchard production. The advantage of the second formula is that it shows how close the packinghouse is coming to the minimum standard of 42 lbs. of fruit per packed box. As the amount of fruit in each packed box increases, the percent packout calculated by the second formula will decline.

d. Some Examples.

Calculation of each of the formulas can be best portrayed by an example. Assume that you have an orchard block that yields 850 field boxes per acre (35 lb. boxes). Average cullage is 4,165 lbs. per acre. There are 426 packed of extra fancy fruit and 183 packed boxes of fancy fruit per acre. To calculate percent cullage, it is necessary to convert yield to pounds. The 850 field boxes has to be multiplied by 35 lbs./field box to get total weight.

$$\% \text{ cullage} = \frac{\text{lbs. culls/ac.}}{\text{lbs. fruit/ac.}}$$

$$\% \text{ cullage} = \frac{4{,}165}{(850)(35)} \times 100$$

$$\% \text{ cullage} = \frac{4{,}165}{29{,}750} \times 100$$

$$\% \text{ cullage} = 14\%$$

The next percentage is percent extra fancy.

$$\% \text{ XF} = \frac{\text{No. of packed boxes XF}}{\text{Total no. of packed boxes}} \times 100$$

$$\% \text{ XF} = \frac{426}{609} \times 100$$

$$\% \text{ XF} = 70\%$$

There are two methods of calculating percent packout. Both will be calculated.

$$\% \text{ packout} = \frac{\text{No. of packed boxes}}{\text{No. of field boxes}} \times 100$$

$$\% \text{ packout} = \frac{609}{850} \times 100$$

$$\% \text{ packout} = 71.6\%$$

The other formula for percent packout is:

$$\% \text{ packout} = \left(\frac{\text{No. of packed boxes}}{\text{Total no. of field boxes - field boxes of culls}}\right) \times 100$$

To get field boxes of culls, it is necessary to divide 4,165 by 35. There are 119 field boxes of culls.

$$\% \text{ packout} = \frac{609}{850 - 119} \times 100$$

$$\% \text{ packout} = \frac{609}{731} \times 100$$

$$\% \text{ packout} = 83.3\%$$

Even though this example uses per acre figures, we could have used the information for the entire block and achieved the same results. As long as field box size or bin size is correct, it doesn't matter how large the orchard block is.

FINANCIAL ASPECTS OF PACKOUT RECORDS

Returns

The F.O.B. returns for a grower's fruit are listed in terms of the type of pack, grade, and size of fruit. These prices will be listed on a packed-box basis.

Returns for culls are indicated on a pound basis. Cull returns will be classified according to end use. Very small fruit and severely damaged fruit are suitable only for juice.

The other common category for culled fruit is peelers, or canners. These fruit have blemishes sufficiently severe to eliminate them from the fresh market grades. The processing value of peelers often results in a slightly higher return to the grower.

Total F.O.B. returns are the sum of the returns from each size and grade classification. The exact method of calculation may vary from one packinghouse to the next.

The listing of per-unit returns together with size and grade data is a good indicator of market preference. A higher price indicates stronger preference. This information should indicate to the grower the individual grades and sizes needed to produce to generate the best returns. It also indirectly indicates which production practices require evaluation.

Charges

The other set of financial information contained in a packout record covers the charges assessed growers. One set of costs covers handling, warehousing, and packing.

Marketing charges are also listed. These costs include brokerage fees, regardless of who does the brokering. Inspection costs also fall into this category.

The final set of charges is assessed by the industry. One assessment is for the support of the Washington Apple Commission. This Commission is charged with the responsibility of conducting promotional campaigns to enhance the sale of Washington apples.

The other industry charge is for the Washington Tree Fruit Research Commission. This Commission funds research by different agencies. A broad range of research is funded by the Commission, much of which is directed toward the enhancement of quality fruit production.

Of the various charges assessed growers, most are out of their immediate control. Industry assessments are determined by referenda. Marketing expenses (brokerage fees and inspection charges) are fairly standard throughout the industry and their levels are not normally influenced by grower opinion.

Handling, warehousing, and packing charges are directly influenced by grower action. More precisely, production and harvest practices have a direct bearing on packinghouse charges.

It has become common practice among packinghouses to assess an in-charge. The the in-charge covers the costs of handling and bin rental, and part of the storage expense.

The most direct way growers incur additional expenses through the in-charge is with partially filled bins. As the amount of fruit in a bin declines, the in-charge per packed box or per field box will increase. Bins that are too full will have additional cullage. However, since pickers are usually paid by the bin, too few fruit, rather than too many fruit is a more common problem. The example in Table 8 shows the effect of only partially filling bins. Here are two orchard blocks with the same production per acre and the same packout per acre. However, the pickers in Block B are careless about filling bins. Because of this carelessness, the owner must pay an in-charge on seven more bins than necessary. At $20 per bin, he is paying $140 per acre more in packing charges for the fruit in Block B compared to Block A. Even with the same production and packout, handling costs for Block B fruit are an additional 20¢ per packed box or 14¢ per field box in packing charges over the fruit from Block A.

Although not included in Table 8, there is an additional cost associated with partially filled bins. Pickers are usually paid by the number of bins picked. So in Table 8, the owner is paying pickers in Block B for seven more bins.

Knowing the size of bin and size of field box, the appropriate number of bins required for an orchard can be determined from the packout record. If the quantity of fruit delivered to the packinghouse is recorded in weight, the number of bins required is determined by dividing total in-weight by the weight of the fruit in a full bin.

If the quantity of fruit delivered is measured in field boxes, then it is necessary to divide the total number of field boxes produced by the number of field boxes in a full bin.

The exact presentation of handling and packing charges will vary from one firm's records to the next. However, most will indicate total charges per field box and/or packed box. Use of these figures for comparison purposes should be done very carefully. Many factors influence the level of charges, not the least of which is high cullage. Low packing charges per field box can be caused as much by excessive cullage as by an efficient packinghouse.

Table 8: Effect of In-Charge and Fullness of Bins on Grower Charges

	Block A	Block B
Field Boxes	1,000	1,000
Bins per acre	40	47
Average bin weight (lbs.)	875	750
Packed boxes per acre	708	708
In-charge per acre ($20/bin)	$800	$940
In-charge per packed box ($)	$1.13	$1.33
In-charge per field box ($)	$ .80	$ .94

In the extreme, a grower could be assessed only an in-charge if none of his fruit meets fresh market standards. In this case, grower charges per field box would be the in-charge divided by the number of field boxes per bin. To this would be added the appropriate industry assessments. An in-charge of $20 per bin and a 25-field-box bin would mean grower charges of 80¢ per field box plus the industry assessments.

A grower with 12 packed boxes per bin would have lower packinghouse charges than a grower with 15 packed boxes per bin.

For example, a 750-field-box yield and 12 packed boxes per bin leads to packing charges of $1,759.20 (based on $20/bin and $3.22/packed box). This works out to $2.35 per field box. Using the same yield and 15 packed boxes per bin generates total packing charges of $2,049 and $2.73 per field box. In this case, the lower costs per field box are a direct result of a poorer packout--higher cullage.

Efficiency in the packinghouse results from being able to handle large volumes of fruit per shift. Well organized equipment and productive employees influence the efficiency of the packinghouse. The grower benefits from efficiency through lower charges.

Fruit grade also affects efficiency. As grade declines and/or cullage increases, the number of fruit handled by graders increases. The increased handling of fruit slows down the packing line. Therefore, as overall fruit grade increases, the packinghouse can handle more fruit per shift. This also reduces packing charges.

SUMMARY AND CONCLUSIONS

Packout records contain a summary of physical characteristics of fruit from the orchard. Included in this information are total quantity, grade, size, cullage, and sometimes the reasons for cullage.

Financial information is also provided in the packout record. The F.O.B. returns by grade and size are listed. Charges assessed the grower are also listed. These charges include handling and warehousing, marketing fees, and industry assessments. Grower receipts are indicated, often in total and on a per-pack basis.

Understanding the information in the packout record is important for two reasons. First, the per-unit price information is important. These prices represent signals to the grower about market preferences. Generally, the higher the price, the more preferred the grade or size. The higher prices indicate what grade and size combinations the grower should strive to produce.

Second, combining the physical characteristics with the price information provides a valuable tool for the grower in evaluating the economic performance of his orchard. The physical characteristics can be compared to guidelines provided here or by horticultural advisors to determine the strengths and weaknesses of the orchard.

Once the weaknesses have been identified, the effects of changing production practices can be evaluated. This is the critical point because changes in production practices can affect both costs and returns. Therefore, it is necessary to estimate both the effect on costs and the change in returns.

If costs are being increased by changes in production practices, then returns must increase by a larger amount to make the altered practice profitable. If costs are reduced, returns must not decline as much as costs. Reducing costs merely to handle expected cash flow problems may result in loss of receipts greater than the reduction in costs. The outcome would be less net income.

In the final analysis, packout records are a good indicator of current health of the orchard. Further, combining packout information with the grower's production cost records provides sufficient information to evaluate the effects on net returns of changing production practices. Economic viability in the face of increasing production in Washington will require increased use of this type of information. If growers are going to survive, they can ill-afford to make less than full use of these data.

APPENDIX A

Comparison of Actual and Suggested Color and Cullage

Individual growers can check the effects of color and cullage on their returns by using the information on their packout records and comparing their actual packout with the suggested guidelines in Appendix Table 2.

1. The first step is to select the suggested guidelines for the variety on the packout record (use Appendix Table 2 in Appendix).

2. Next, convert the volume of fruit covered by the packout record to pounds. If fruit delivered is measured in weight, no conversion is necessary. If bins or field boxes are used as the measure of fruit in the packout record, they must be multiplied by the weight of fruit per bin or field box.

3. The third step is to calculate F.O.B. returns by grade and returns per pound of culls.

   a. Total the value of the extra fancy fruit on the packout record. Divide the total by the number of packed boxes of extra fancy fruit. This gives the price per packed box of

      extra fancy fruit, i.e.:

$$\text{Price/box XF fruit} = \frac{\text{Value of packed boxes XF fruit}}{\text{Number of packed boxes XF fruit}}$$

   b. Next, total up the value of the packed boxes of fancy fruit and divide by the number of packed boxes of fancies. The result produces average return (F.O.B.) per packed box of fancy fruit, i.e.:

$$\text{Price/box fancy fruit} = \frac{\text{Value of packed boxes fancy fruit}}{\text{Number of packed boxes fancy fruit}}$$

   c. Then calculate the price of culls per pound as:

$$\text{Cull price per pound} = \frac{\text{Total value of culls}}{\text{Pounds of culls}}$$

4. Packing costs are also required. The number of packed boxes may change when packout is calculated using the suggested guidelines selected in step 1. Depending upon packinghouse accounting procedures, which vary from house to house, in-charges and storage assessments may be based on the amount of fruit received. Charges based on fruit received will not change when calculating returns based on the guidelines. A valid comparison requires correct identification of the costs that are affected by the number of packed boxes. First, total the charges based on incoming fruit. Then calculate the rest of the charges on a packed box

basis. Most records will list these charges on a per-pack basis. The sum of these individual per pack charges is adequate. If the record only shows totals, then the total charge must be divided by the total number of packed boxes.

5. The fifth step is to multiply the total inweight by the suggested guidelines. Since the guidelines are percentages, it is necessary to divide by 100 to get the volume of fruit in each grade. For the extra fancy and fancy grade fruit, it is also necessary to divide by 42 to get the number of packed boxes in each of these grades.

6. Taking the prices from step 3, calculate total returns. Multiply the extra fancy price by the number of boxes of extra fancy fruit. Perform the same multiplication using fancy prices and packs. Also calculate the value of the culls (price x quantity). The total of these three figures represents gross returns.

7. Calculate total packing charges by multiplying the total number of packed boxes (extra fancy plus fancy) by the total per pack charge calculated in step 4. Add this figure to the charges based on fruit delivered.

8. Net returns are calculated by subtracting the total in step 7 from the total in step 6. This represents grower returns.

9. Finally, compare net returns in step 8 with actual receipts as shown on the packout record. The difference reflects the additional amount of money the grower could have spent to achieve the selected guideline and be no worse off than he actually is.

EXAMPLE

Two hundred eighty-five bins of Red Delicious from an orchard block are run on February 30, 1981. The fruit had been in regular storage. Appendix Table 1 is the packout record for that fruit.[1/] The sample block is composed of super red sport strains so the appropriate suggested guideline from Appendix Table 2 is 76% extra fancy, 19% fancy, and 5% culls.

The next step is to calculate weight of fruit. These bins hold about 875 pounds of fruit so fruit weight = 875 lbs. x 285 bins = 249,375 lbs. of fruit.

1/ This is a fictitious packout record. It is used for illustrative purposes only. The format of this record is not necessarily the best nor does it provide all of the appropriate information. It was developed only for the purposes of evaluating the economics of grade.

The average F.O.B. return for extra fancy fruit is (see the packout record):

$/XF pack = $37,295.5/4,009 packs
= $9.303

Fancy F.O.B. returns are:

$/F pack = $9,581.65/1,334 packs

= $7.183

Cull prices are stated on the record as 3¢/lb.

The fixed packing charges (based on fruit delivered) are $20 per bin or $5,700. Since total production does not change, the $5,700 does not change. The packed box charge is the sum of $2.52, $.20, and $.50 or $3.22 per packed box.

Next, calculate packout based on the guideline percentages selected earlier. (Note that the percentages were divided by 100.)

Extra fancy fruit:

$$\text{Packed boxes} = \frac{249{,}375 \text{ lbs.} \times .76}{42 \text{ lbs./box}}$$

= 4,512

Fancy fruit:

$$\text{Packed boxes} = \frac{249{,}375 \text{ lbs.} \times .19}{42 \text{ lbs./box}}$$

= 1,128

Total packed boxes = 1,128 + 4,512 = 5,640

Cullage:

Lbs. of culls = 249,375 lbs. x .05

= 12,469

Total returns:

Extra fancy returns = 4,512 @ $9.303	$41,975.14
Fancy returns = 1,128 @ $7.183	8,102.42
Culls returns = 12,469 x $.03	374.07
Total Returns =	$50,451.63