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SOME CAUSES OF PEACH PRICE  
VARIATIONS ON THE BENTON HARBOR  
WHOLESALE FRUIT MARKET

Thesis for the Degree of M. A.  
MICHIGAN STATE COLLEGE  
Dale Ernest Hathaway  
1948

Index

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thesis entitled

**"Some Causes of Peach Price  
Variations on the Benton Harbour  
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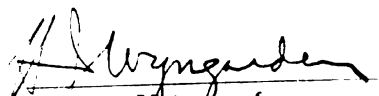
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\_\_\_\_\_ degree in \_\_\_\_\_

**Master of Arts in Economics**

  
Major professor

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SOME CAUSES OF PEACH PRICE VARIATIONS ON THE  
BENTON HARBOR WHOLESALE FRUIT MARKET

By

DALE ERNEST HATHAWAY

A THESIS

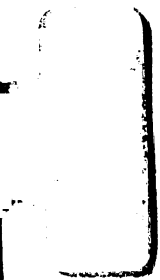
Submitted to the School of Graduate Studies of Michigan  
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THESIS



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DALE ERNEST HATHAWAY



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## CHAPTER I

### INTRODUCTION

Peach growing is a major industry in Michigan. The 1947 peach crop in Michigan was estimated at 4,526,000 bushels which was below the record crop of 1946 but 36 percent above the 1936-45 average.<sup>1/</sup> Michigan was fourth in peach production in 1947 behind California, South Carolina, and Georgia. In Michigan the bulk of the peach crop was sold for fresh consumption.

Peach growers, like those of other farm commodities, have been constantly troubled by the highly irregular price fluctuations of their product. The Benton Harbor Wholesale Fruit Market was considered ideal for the study of the factors causing these wide fluctuations in peach prices. The volume of sales of this market is so large that it is a major factor in determining fresh peach prices for the entire state. The competitive selling methods used make possible a quality-price study of this type.

The gathering of the data for this study required the cooperation of a large number of persons. Mr. Stanley Lee, Market Master and Mr. J. H. Selby, Market News reporter, were the men who were chiefly responsible for the fine cooperation that was received. Both growers and buyers were very helpful in the study by making available all the information requested. It is hoped

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<sup>1/</sup>

"Marketing the Michigan Peach Crop", a brief review of the 1947 season, U. S. Department of Agriculture, Production and Marketing Administration and Michigan Department of Agriculture, Bureau of Foods and Standards.

that the information presented here will repay these cooperators for their help.

Several factors affect peach prices. The most important of these is the general level of prices. Peach prices have nearly always followed the general price trend (Figure 1).

Another factor affecting peach prices is the size of the peach crop. Prices are higher in short crop years and lower in years of large crops. The small crop was chiefly responsible for the extremely high price in 1943, and the large crop accounted for the low price in 1947. The alternately small and large crops cause the major variations of peach prices from the general price level.

There is another factor affecting peach prices which causes seasonal price variation during the peach marketing season (Figure 2). This variation is due to the volume of peaches marketed at any one time during the season. With light marketings early in the season the price is usually high. As the volume of marketings increase the price declines until slightly after the peak of the marketings at Benton Harbor. Then as marketings fall off again the price rises. During the latest five year period the price decline from the early season peak to the season low price was over forty percent of the average price.

A different type of variation in peach prices is the variation within the standard grades due to variations in market quality. Many of the factors causing these variations are within the control of the grower. The season average price for U. S. No. 1, 2 inch and up, Halehaven peaches was \$2.13 per bushel, and the

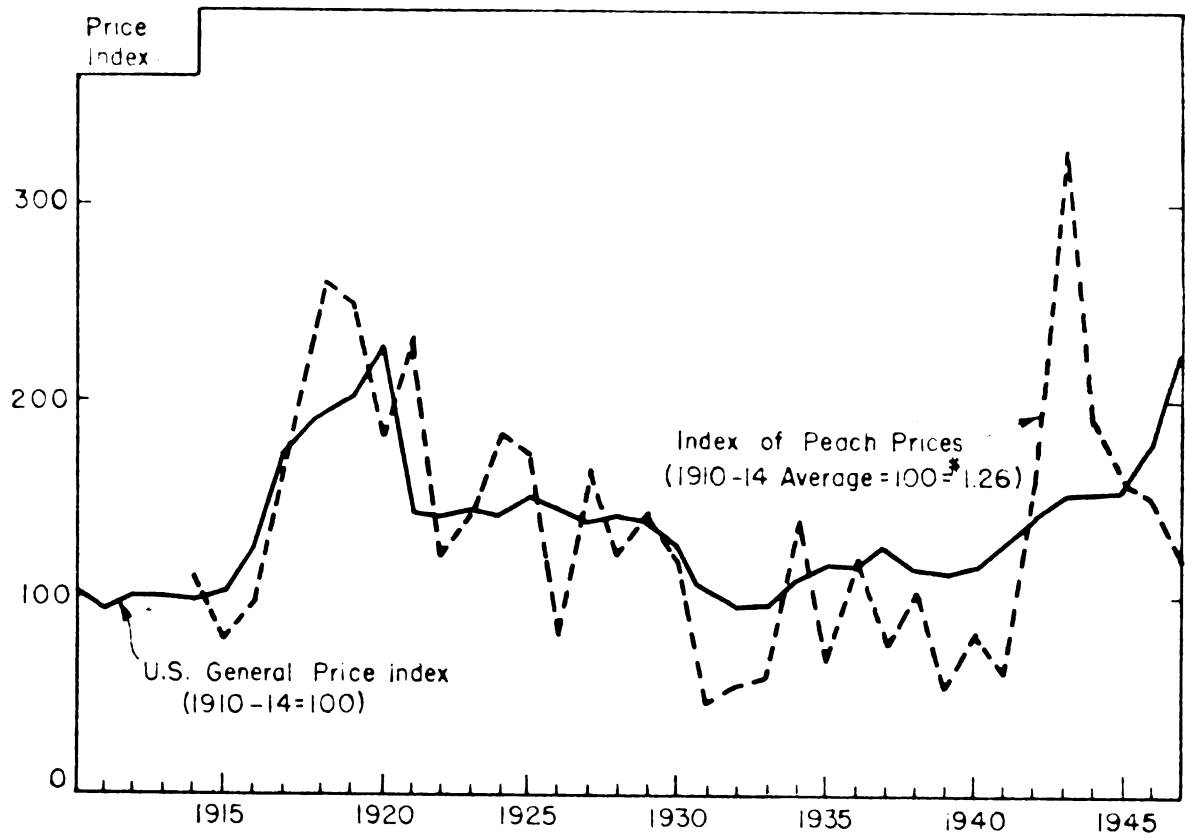


Figure 1. Peach Prices and The General Price Level, 1910-1947.



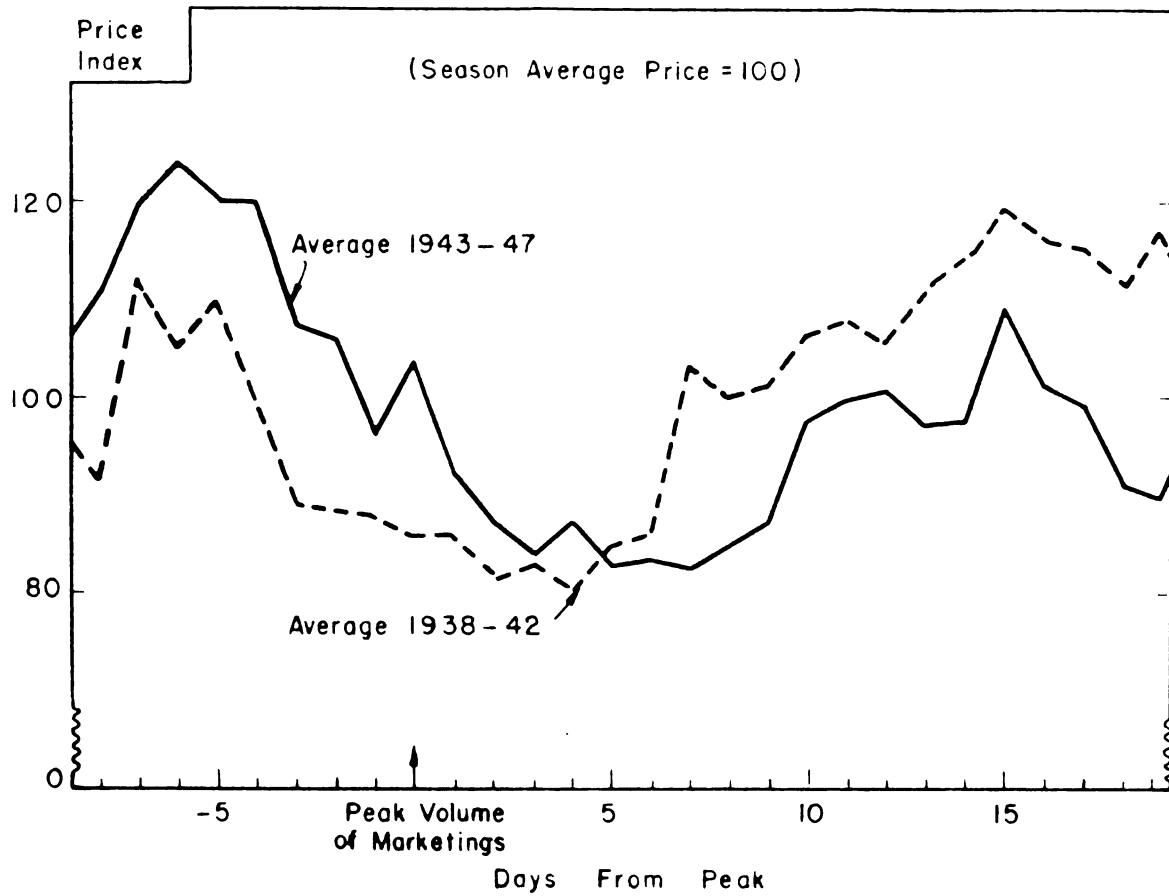


Figure 2. Seasonal Variation in the Price of Elberta Peaches on the Benton Harbor Market, 1938-1942 and 1943-1947.

average price variation within this grade between the high and low price paid each day was  $\$.72$  per bushel (Figure 3). The average price for U. S. No. 1, 2 inch and up, Elberta peaches was  $\$1.84$ , and the average price variation in this grade between the high and low price paid each day was  $\$.61$  per bushel (Figure 4).

The variations in peach prices due to variations in the general price level, size of the crop, and volume of marketings can be affected slightly or not at all by individual producers. The purpose of this study was to discover the causes of the ranges in daily prices per bushel and to determine the amounts by which producers may increase prices by varying the factors responsible.

The Benton Harbor Wholesale Fruit Market was used in this study because of its volume of business and location. There were 1,293,891 bushels or 28 percent of the Michigan production of peaches sold on this market during the 1947 season.<sup>1/</sup> Because of this large volume and the competitive nature of the sales on this market, it was considered representative of the peaches marketed in Michigan.

The scope of the study was limited to the Halehaven and Elberta varieties of peaches representing about 78 percent of the peaches grown in Michigan.<sup>2/</sup> The study was further limited to those peaches marked U. S. No. 1 , 2 inch and up because this size made up the bulk of the sales in 1947. It was believed that any quality factors

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<sup>1/</sup> Summary of the Benton Harbor Wholesale Fruit Market for 1947.

<sup>2/</sup> Unofficial estimate based on data furnished by the office of the Michigan State Agricultural Statistician, Lansing Michigan, placed Halehaven production at 30 percent and Elberta production at 48 percent of the total peach crop harvested in 1947.

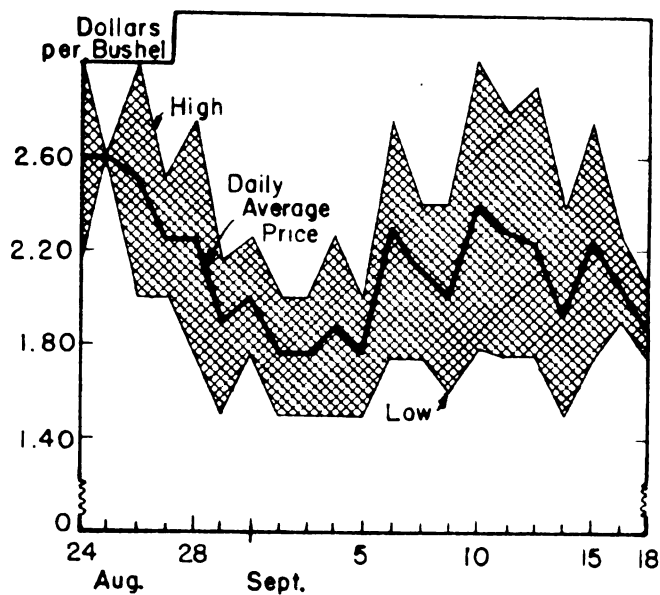


Figure 3 . Range in Daily Prices of 2-inch and Up Halehaven peaches, Benton Harbor Market, 1947.

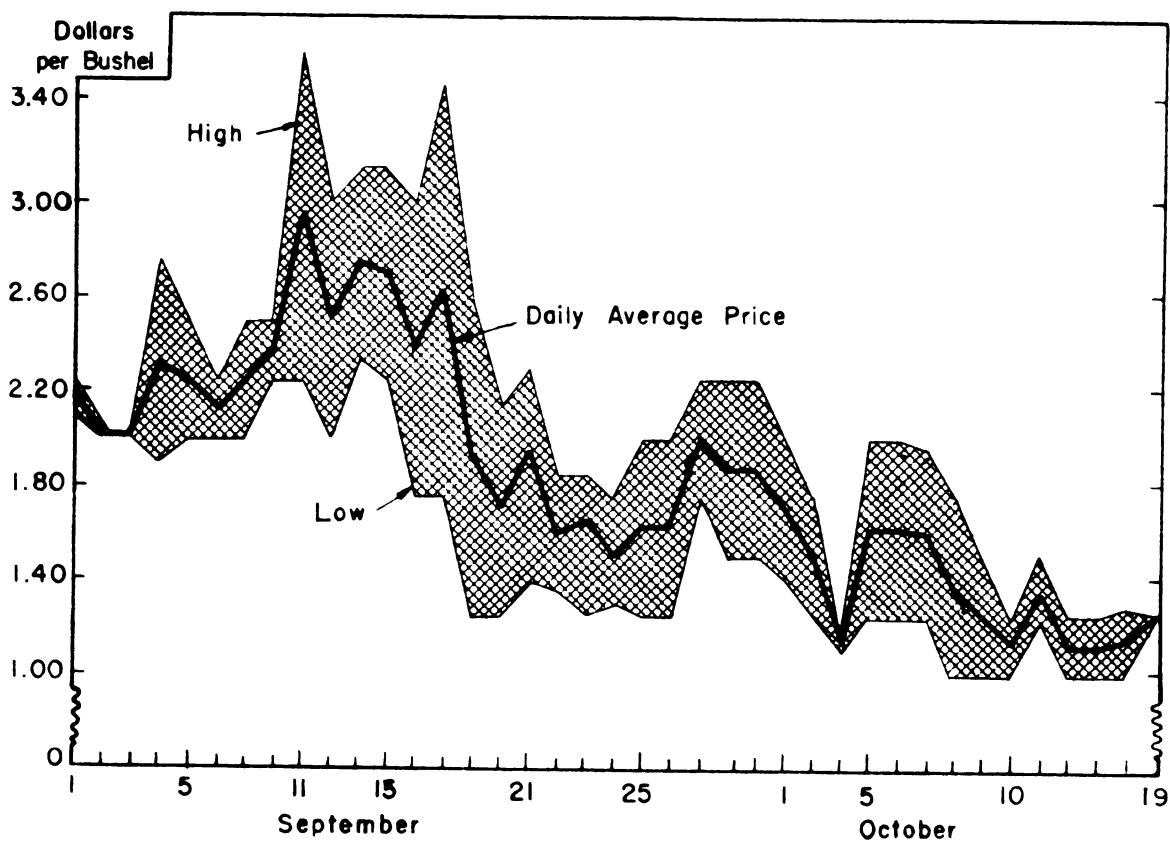


Figure 4 . Range in Daily Prices of 2-inch and Up Elberta Peaches, Benton Harbor Market, 1947.

affecting the price of this size would have a corresponding effect on the other sizes marketed.

Character of the 1947 crop. The 1947 peach season was about two weeks late. Hot weather in late August hurried the ripening and had some effect on the quality of the Halehaven variety. (Appendix A). The result was that the Halehavens were generally more irregular in size and ripeness than the Elbertas. Cold weather during the later part of the Elberta season was thought by many to have affected marketing adversely. Many Elbertas were marketed greener than they would have been had the weather stayed hot.

The two varieties were marketed in very nearly the same way. Both received about the same treatment in packaging and display and both varieties were sold by the same type of seller. (Appendix A). There was some difference in the type of buyers in the two varieties.

## CHAPTER II

## METHODS

Methods of gathering data. Sales on the Benton Harbor Market are made on an individual basis with the buyer and seller bargaining to reach a mutually agreeable price. To collect data for this study the enumerator mingled with the buyers and took records on various loads of peaches as they were sold. The peaches were rated on appearance, firmness, color, and visible defects. In addition the position of the seller on the market, the number of packages on the load, type and fullness of the package, the time of day, the price received for the peaches, and other data thought to affect this price were recorded. Observations were usually confined to the particular baskets opened by the buyers, and the inspection was made in the manner used by the buyers. The data sheet used in gathering the information is shown in Appendix B.

Because of arbitrary judgements involved in gathering the data, it was thought desirable to limit the work to one person. In order to obtain records of the sales it was necessary to remain near each load until the sale was completed. On some days the number of records taken was small because of the slowness of the sales.

Data on market price movements and market activity(whether sales were rapid or slow) were obtained through observation by the enumerator. All information on volume of sales and daily average prices were taken from the Federal Market News Service reports.

The data was gathered between September 1, and September 23, 1947. This period included the peak marketings of both the major varieties.

Methods of analysis. The collected data were arranged in order by time of sale and coded for analysis on International Business Machines cards (Appendix C). To remove the effect of daily price variation each individual sale was compared with the daily average price for that day. This difference was expressed as a positive or negative residual.

Tabulations of this price residual were made for all of the various factors suspected of causing price variations. Where differences in price residuals appeared to be associated with the factor being studied the F test was used to determine if these differences were significant. <sup>1/</sup> Since many of the factors studied were closely related to the factor general appearance, the effects of general appearance were removed before measuring the effect of the related factor on price. The F test of significance was run on each subsort.

Limiting Factors. It was not possible to assign accurate numerical values to the quality factors being studied. With the placing of accurate values on quality factors it would be possible to correlate these quality factors with general appearance. This would determine the relative importance of these factors on general appearance and relate them directly to price. It should be the purpose of another study to determine ways to set up numerical values on factors studied in this type of quality-price analysis.

The method of gathering data also limited the number of observations because of the time involved in finishing the record of

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<sup>1/</sup> For an explanation of the F test see Appendix D.

some of the sales. There were 382 completed records in the study and this relatively small number limited the number of subsorts that could be made. The number was large enough to make those conclusions drawn valid, but it limited in several ways the factors available for study.

## CHAPTER III

## GENERAL APPEARANCE AND RELATED FACTORS

Effect of general appearance on price. General appearance had a highly significant effect upon price and was the most important factor causing variations in the price paid for peaches (Figure 5).

There was a much wider range of quality in the Halehaven variety than in the Elbertas. This extreme range in quality in the Halehaven variety resulted in a greater price differential between fair general appearance and good general appearance in the Halehaven variety than in the Elberta variety.

Not only did the Halehavens have a wider range of quality but they also had somewhat poorer general appearance on the average. In the Elberta variety 57 percent of the peaches examined had excellent general appearance while only 46 percent of the Halehavens were in this classification. This difference was made up with 47 percent of the Halehavens in the general appearance good classification as compared with 36 percent of the Elbertas (Appendix A). In the general appearance fair classification the two varieties had about the same percentage.

This indicates that Halehaven producers have the greatest chance to improve price by improving general appearance. There was a twenty-four cent difference in the price between fair and good general appearance in the Halehaven and only three cents in the Elberta variety. It is in this range that Halehaven producers had the greatest chance for improvement.



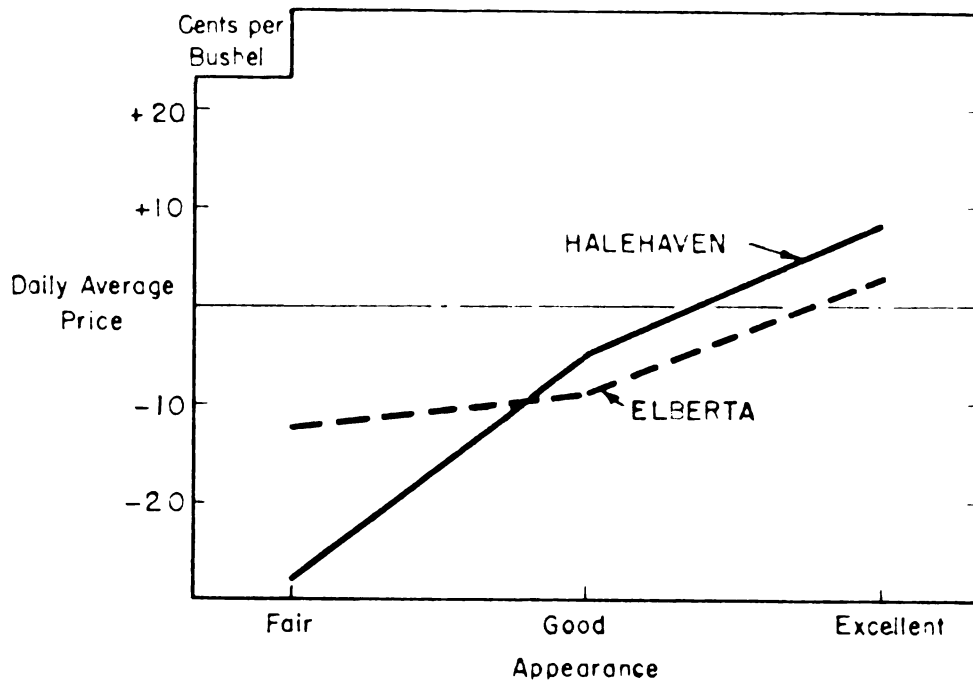


Figure 5. Effect of General Appearance on the Price of Halehaven and Elberta Peaches.

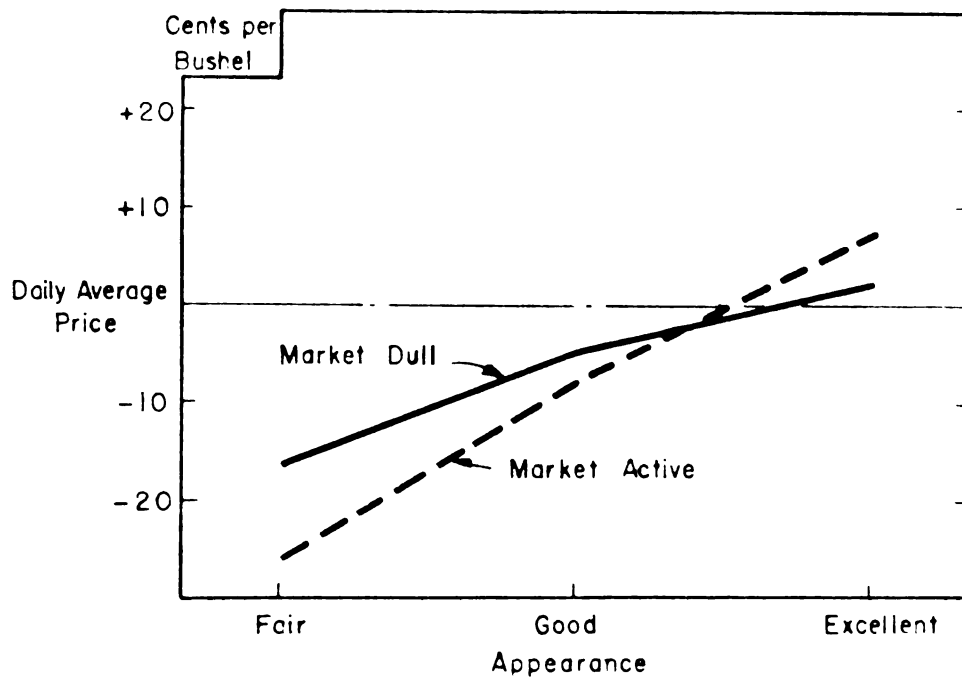


Figure 6. Effect of General Appearance on the Price of Halehaven and Elberta Peaches with Varying Market Activity.

It should be remembered that when general appearance is discussed a perfect line of distinction cannot be drawn between classifications. While a producer might use methods that would move his peaches from the upper part of one classification to the lower part of the classification above it, he could not expect to increase his price as much as the average differences shown on the graphs.

Several factors were related to general appearance.<sup>1/</sup> One of the most important was the shredded paper covering used on the facing of the baskets. This paper had a greater effect upon the appearance of Elbertas than on the Haleh vens a parently because the Haleh ven variety has more natural color and did not need the added emphasis on color. The paper also caused the peaches to appear brighter.

Another factor significantly associated with general appearance was percent of red. This factor was also more important in the Elberta variety where a lack of red color was frequently found. In both varieties the general appearance rating went up with increases in red color.

Another factor which affected general appearance was the brushing of the peaches. This was not as important as the other factors mentioned, but brushing did improve the general appearance slightly, especially where color was lacking.

The color of red, color of green, or fullness of the package had no significant association with general appearance.

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<sup>1/</sup>

For a discussion of the method used in testing these associations see Appendix E.

Because of the great effect of general appearance on price, it will usually pay the farmer to improve it. This can best be done by one or more of the practices just discussed.

Practices that increase red color at picking time or bring out color after picking were especially significant in the Elberta peaches. The use of shredded paper and the brushing of peaches both apparently emphasized the general appearance and increased the price of peaches.

General appearance had a different effect on price when the market was dull than when it was active (Figure 6). <sup>1/</sup> On days when the market was dull there was an eleven and one-half cents per bushel difference between fair and good general appearance. When the market was active there was an eighteen cents per bushel difference. On dull days there was a seven cents per bushel difference between good and excellent appearance, and on active days it was fifteen cents per bushel difference. This shows that the buyers pay an even greater premium for quality on the days the market is active.

Effect of shredded paper on price. The use of shredded paper on the face of the peaches had no direct effect upon price. Shredded paper and cellophane did show significant association with general appearance in both varieties of peaches. Thus, the use of paper or cellophane indirectly improved price by improving appearance.

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<sup>1/</sup> Both varieties of peaches were grouped together to study the effect of market activity.

About 40 percent of the peaches marketed had nothing added to the face of the peaches to improve appearance. Since the cost of this colored paper and cellophane is low it usually paid the farmer to use it to help improve the appearance of his peaches.

Effect of brushing on price. Brushing had no significant effect upon the price of either variety of peaches other than as it affected their appearance. Brushed Halehaven peaches brought an average of fourteen cents per bushel more than unbrushed, and brushed Elberta peaches brought an average of twenty-one cents per bushel more than unbrushed. These differences were mostly due to differences in appearance. Within a given general appearance class the unbrushed brought as much as the brushed.

When the general appearance was excellent, brushing was of little value. Where the general appearance was below excellent the brushing apparently improved the price through improving appearance.

Effect of percent of red on price. The percent of red on the face of the peach had no direct effect upon price. The amount of red was associated with general appearance and thus indirectly affected the price. As the face of the peach became more covered with red, the general appearance improved. Since the Elberta variety lacked color and ripeness, the red color was more important here.

Growing, harvesting and marketing practices that increase or accentuate the red color in peaches will apparently pay the producer if the peaches might otherwise lack color. In the Halehaven variety any increase in red over 50 percent does not seem

to improve appearance. In the Elberta variety appearance improved as the percent of red increased throughout the entire range of the peaches observed.

Effect of color of red on price. Color of red had no significant effect upon the price of peaches. It was also found that the color of red had no association with general appearance. Thus, the color of red had no effect upon price either directly or through its effect upon general appearance.

Effect of color of green on price. Color of green had no significant effect upon price. In the Halehaven variety there was no association between color of green and general appearance so there was no indirect effect either. In the Elberta variety there was some association between general appearance and color of green with the lighter green or "yellow green" giving the best general appearance. This was undoubtedly associated with ripeness and the fact that many Elbertas were marketed too green.

The effect of color of green upon the appearance of the Elbertas was not important enough to receive producer attention. If Elbertas are marketed at the proper ripeness, this will correct itself.

## CHAPTER IV

## FIRMNESS AND DEFECTS

Effect of firmness or ripeness on price. Firmness had a highly significant effect on price. Buyers rarely, if ever, bought a load of peaches without first feeling of peaches from one or more sample baskets. This was evidence of the importance they attached to firmness or softness. It appeared from the prices paid by the buyers that the Halehaven peaches were often marketed too ripe or soft while Elberta peaches were marketed too green or hard.

The highest prices were paid for very hard and the lowest for very soft Halehaven peaches (Figure 7). Softness causes a significant discount in price in the fair and good quality peaches but not in the excellent peaches. For instance, soft peaches brought 26 cents per bushel less than very hard ones when their general appearance was fair, 12 cents less when appearance was good, and only 8 cents less when it was excellent (Figure 8).

During 1947, 46 percent of the Halehaven peaches observed were marketed at the very hard stage, 46 percent at the firm stage, and 8 percent at the soft or very soft stages. This would indicate that about half of these peaches would have brought more had they been marketed earlier. Most of these Halehaven peaches had ample size and color so that they would not have been discounted on these points.

The Halehaven grower with peaches of marketable size who delayed harvest during the early part of the season lost money in

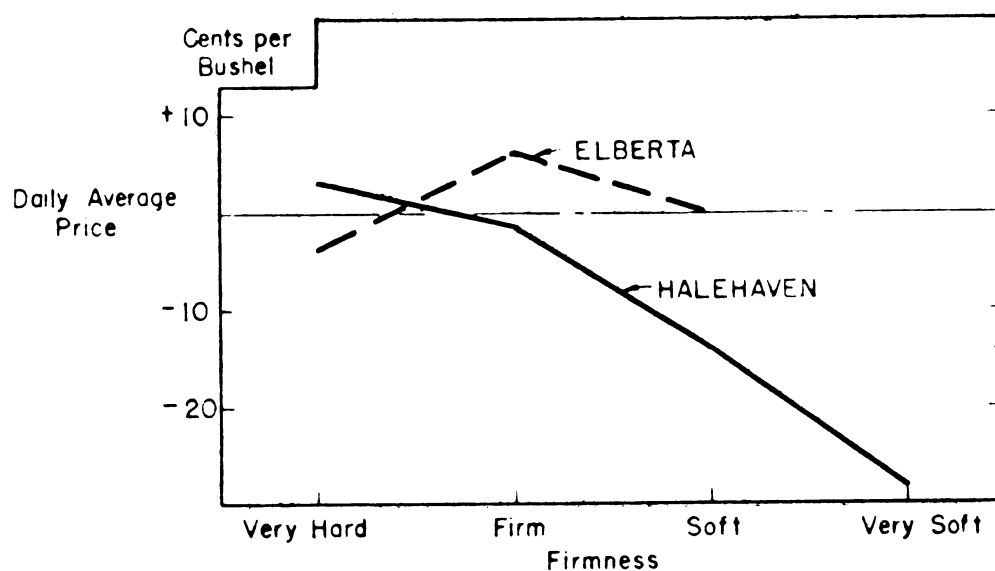


Figure 7. Effect of Firmness on the Price of Halehaven and Elberta Peaches.

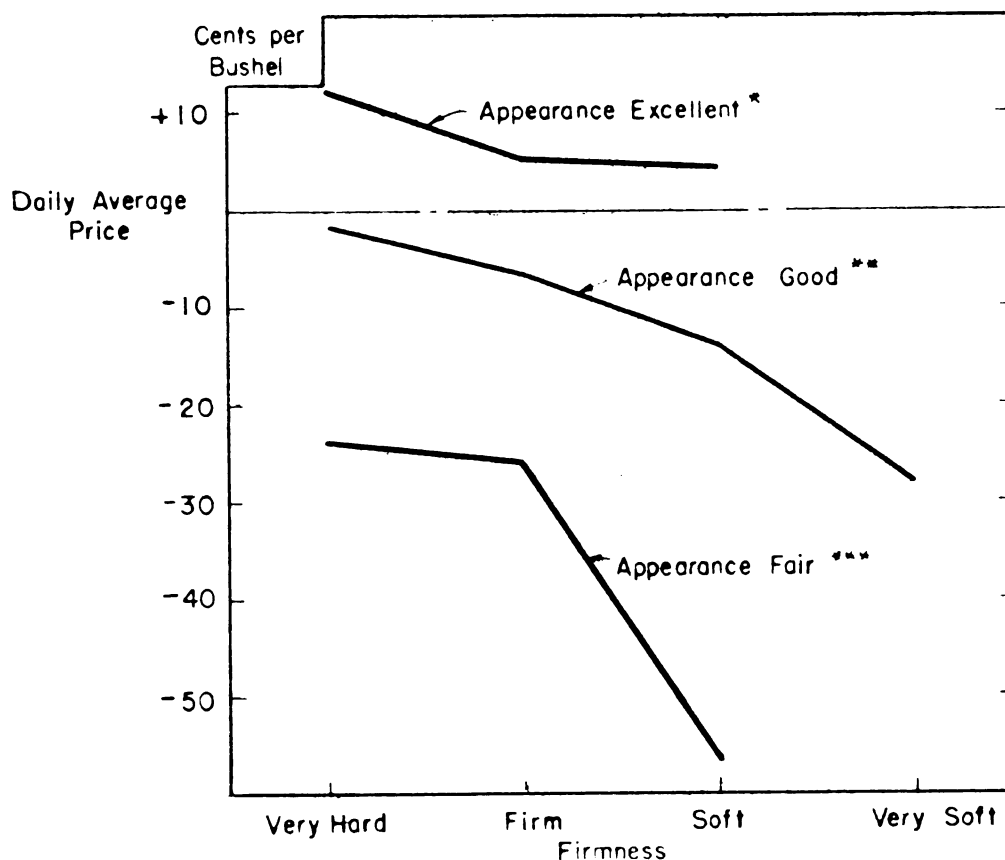


Figure 8. Effect of Firmness on the Price of Halehaven Peaches with Varying Appearance.

\*Not Significant \*\*Significant at 2% \*\*\*Significant at 1%

two ways. As the season progressed peach prices fell, and his peaches became riper and were discounted for softness (Figures 3 and 8).

A consideration as yet unmeasured is the quality of these very hard peaches when they are offered to the consumer and the effect of this quality on immediate and future peach sales. The fact that this premium for hard peaches existed was an indication that the trade believed that there was more demand for them. Whether it was because they bruised less, were less subject to rots, or would carry better for these and other reasons was not determined in this study.

The Elberta variety presented a different picture from the Halehovens. When the general appearance of the Elberta variety was excellent the very hard peaches did not bring as good a price as the firm ones (Figure 9). In the two lower appearance groups of Elbertas there was no significant difference in price due to softness.

Elberta producers marketed 93 percent of their excellent quality peaches at the very hard stage and 7 percent at the firm stage or softer. This indicated that many of the Elberta producers might have gained by marketing riper peaches. When the peaches were of fair or good general appearance the early marketings were apparently profitable but 57 percent of the Elbertas had excellent general appearance, and many of them would have brought higher prices had they been riper. It is possible that the appearance of many of the fair and good peaches would have



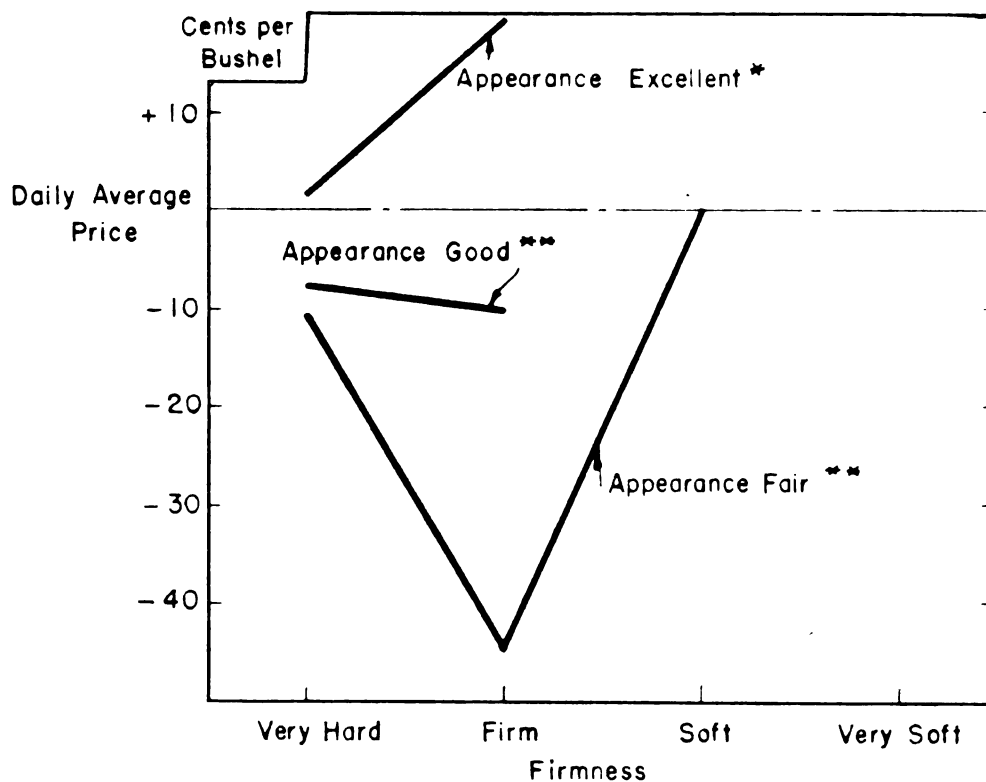


Figure 9 . Effect of Firmness on the Price of Elberta Peaches with Varying Appearance.

\* Significant at 2% \*\* Not Significant

become excellent if they had ripened longer. Not only would their firmness have been more favorable, but their general appearance would have improved by the added color.

A producer marketing excellent quality Elberta peaches would usually gain by picking at the very hard stage during the early part of the season when prices are normally falling if the peaches are of sufficient size. In the latter part of the marketing season it would usually pay to allow the excellent quality peaches to ripen more to take advantage of the rise in price due to both ripeness and normal seasonal variation. The producer also gets an advantage of greater yields as the peaches "swell" on ripening.

Effect of defects on price. Defects caused significant differences in the price of peaches (Figure 10). Bruising caused the greatest price discount of any defect for both varieties of peaches.

In the Halehaven variety bruising was the most significant defect in good and excellent quality peaches and the second most in fair quality (Figure 11). Knots had the greatest effect on the price of those peaches with fair general appearance. A combination of bruise and knot when general appearance was good seemed to have little effect. Basket cuts and other small defects have very little effect upon the price of the Halehaven variety.

It appears that it would pay Halehaven producers to pay particular attention to bruising. Other defects observed should

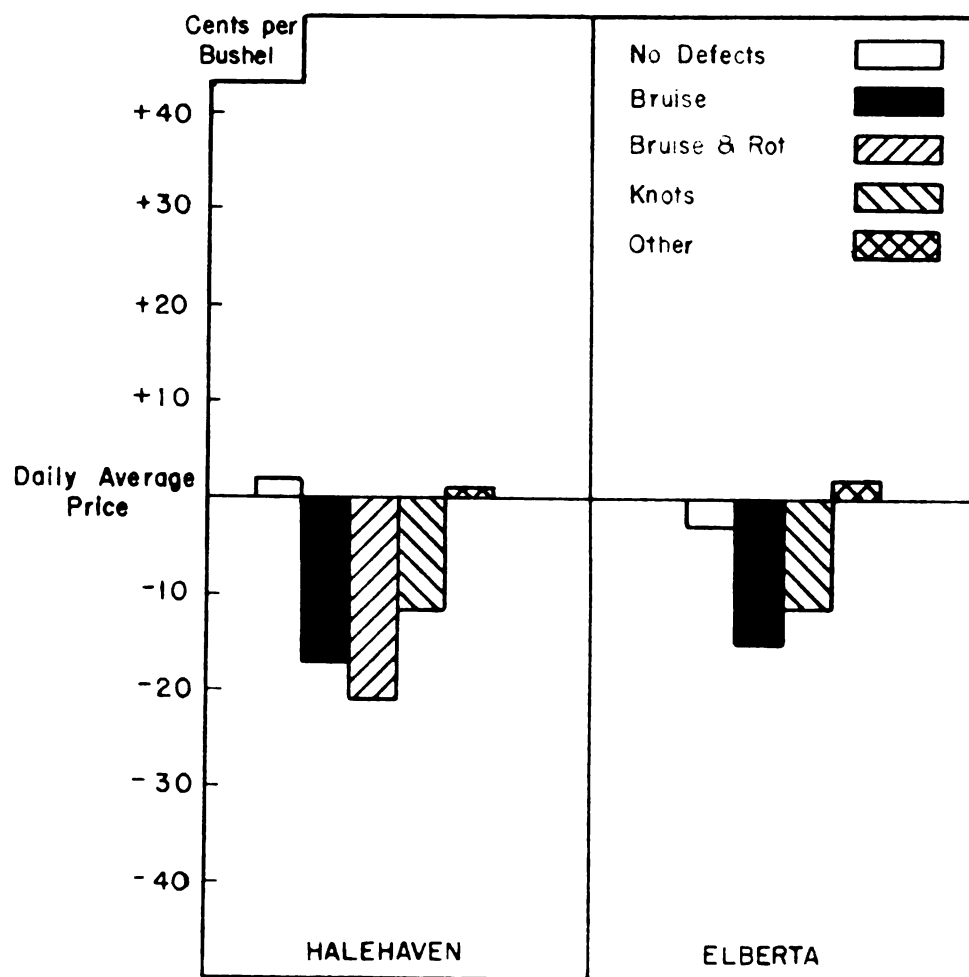


Figure 10. Effect of Defects on the Price of Halehaven and Elberta Peaches.

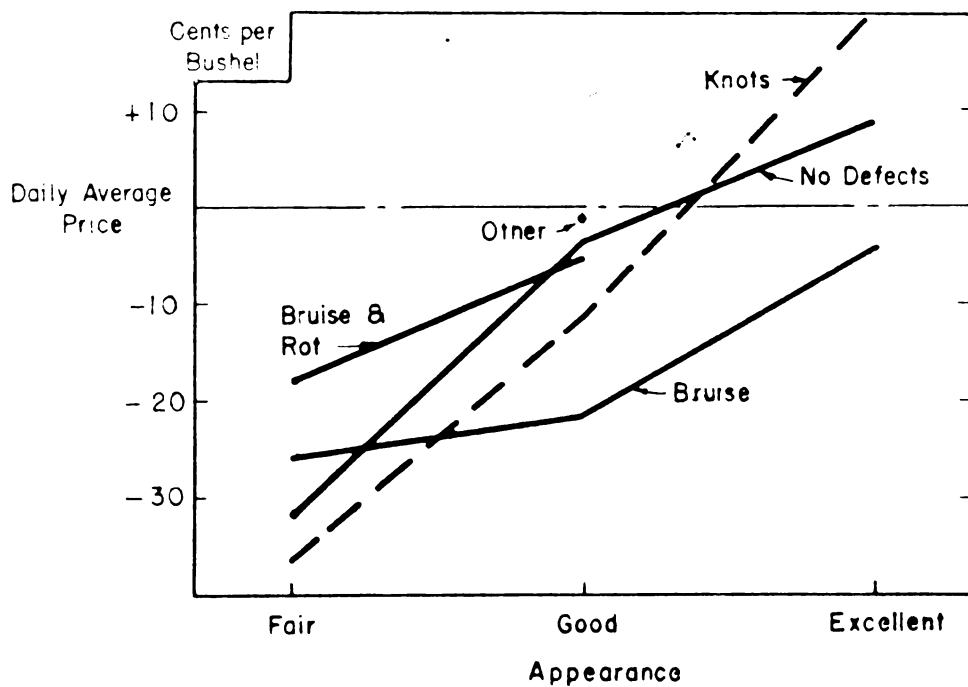


Figure 11. Effect of Defects on the Price of Halehaven Peaches with Varying Appearance.

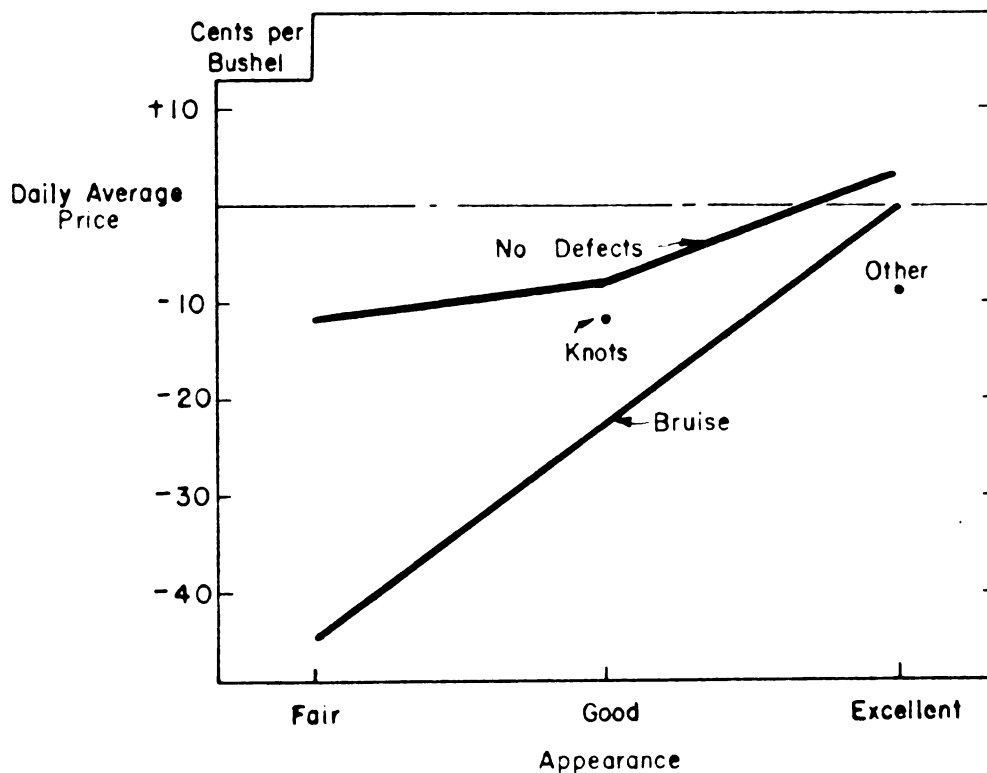


Figure 12. Effect of Defects on the Price of Elberta Peaches with Varying Appearance.

\* This defect appeared only in this appearance class.

be watched closely when they or other factors caused poorer general appearance.

In the Elberta variety bruise was the most costly defect (Figure 10). When the general appearance was good bruise was the most costly defect again, causing a fifteen cent per bushel difference in price. When general appearance was excellent in the Elberta variety, bruised peaches had no significant effect on price while cuts and other small defects caused an eleven cent difference (Figure 12).

The defects that had the greatest effect on price were those affecting shipping quality. Other defects seemed to be important mainly as they affected appearance.

## CHAPTER V

## MARKET FACTORS

Effect of position on the market on price. The Benton Harbor market is divided into eight selling lanes each of which extend about 300 yards. On days of heavy peach movements the two outside truckers lanes also were used for selling. This gave ten selling lanes during the rush periods.

To measure the effect of the sellers position on the market on price, the market area was divided into three approximately equal areas and the position and lane in which the sale was made was recorded (Figure 13). The first half of the paved area was position number one, the second half was position number two, and the entire area beyond the flagpole was position number three.

In the marketing of the Halehaven peaches there was no significant difference in price due to position on the market. Many Halehaven producers were forced to move far down on the market because they had lower quality peaches, but like quality Halehaven peaches brought comparable prices on all parts of the market.

In the Elberta variety there was a significant difference in price due to position in the fair and excellent general appearance classes (Figure 14). The differences in "good" peaches were in the same direction as those in "fair" and "excellent" ones but they were not significant.

There was no indication in the results of this study as to the



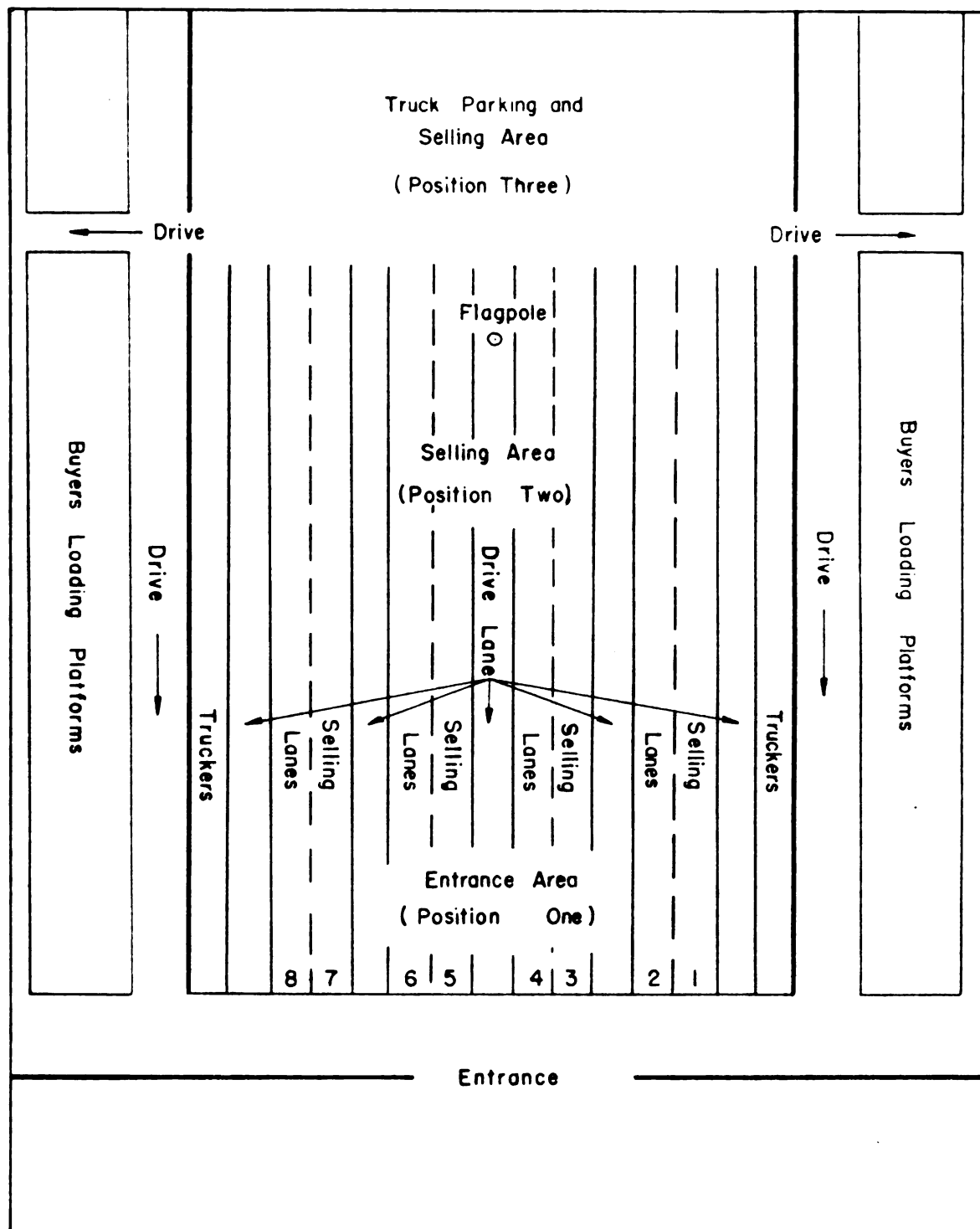


Figure 13 . Diagram of the Selling Section of the Benton Harbor Wholesale Fruit Market showing Position and Lane Numbers used in Peach Price Study.

(Not drawn to Scale)



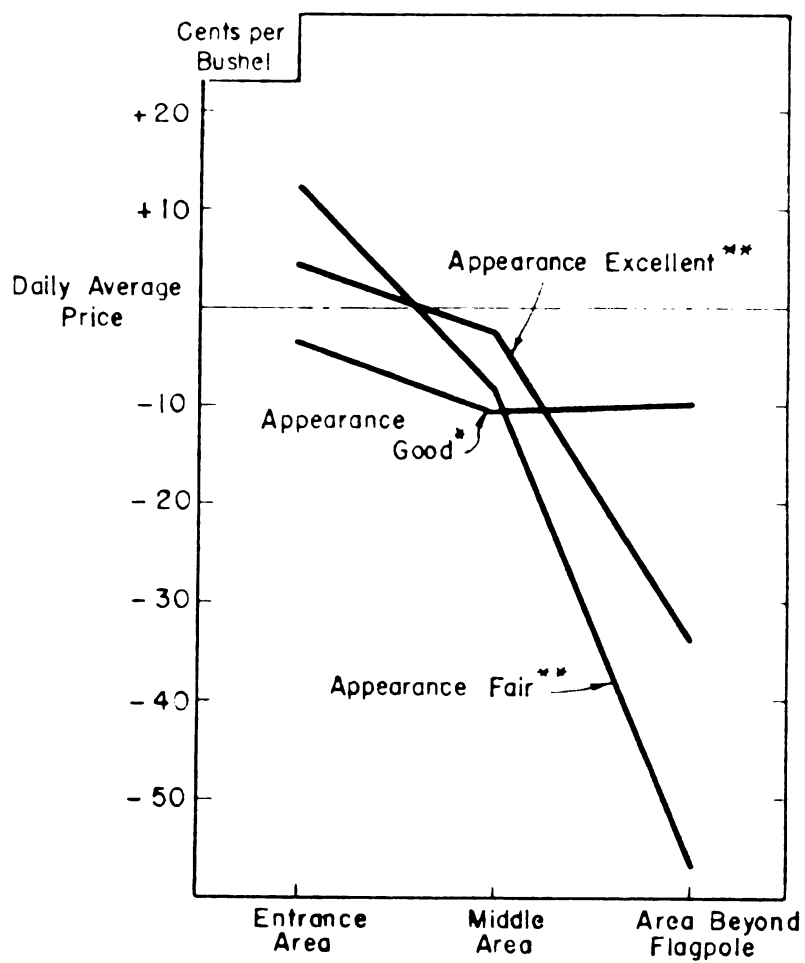


Figure 14. Effect of the Position of the Seller on the Market on the Price of Elberta Peaches.

\* Not Significant \*\* Significant at 1%

reasons for price differences due to position in Elberta and not in Halehaven peaches. Perhaps this difference was due to the difference in volume of loads on the market during the Halehaven and Elberta seasons. Further work is needed to discover the factors responsible for the price differences which appeared only in the Elberta variety.

To study further the effect of position on the market all peaches were grouped together. It was found that when the daily price movement was steady there was a significant lowering of price as the seller moved away from the gate (Figure 15). On days when the market price was rising or falling there was no significant difference in price due to position on the market. These differences may have been due to the different actions of the buyers on different days. On the days when the price was about steady most of the buyers gathered about the entrance of the market. If a load of peaches was pushed beyond this first group of buyers the seller usually had fewer buyers bidding for his load and was offered less for the same quality of peaches. On days when price was down the market was usually full, and the buyers moved away from the entrance to buy at their leisure.

The position on the market caused a significant difference in price when the market was active (Figure 16). When the market was dull the position on the market had no significant effect upon price. As previously mentioned, when market activity was slow the buyers spread out over the market. On active days they concentrated near the gate to catch loads as they entered.

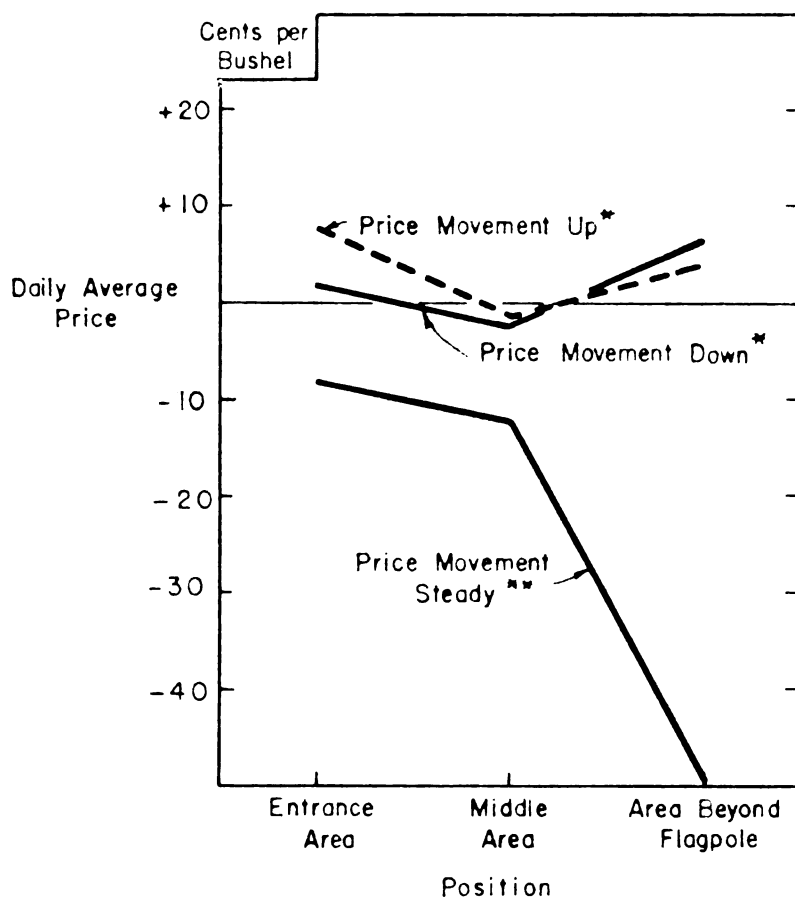


Figure 15. Effect of Position of the Seller on the Market on the Price of Halehaven and Elberta Peaches with Varying Market Price Movement.

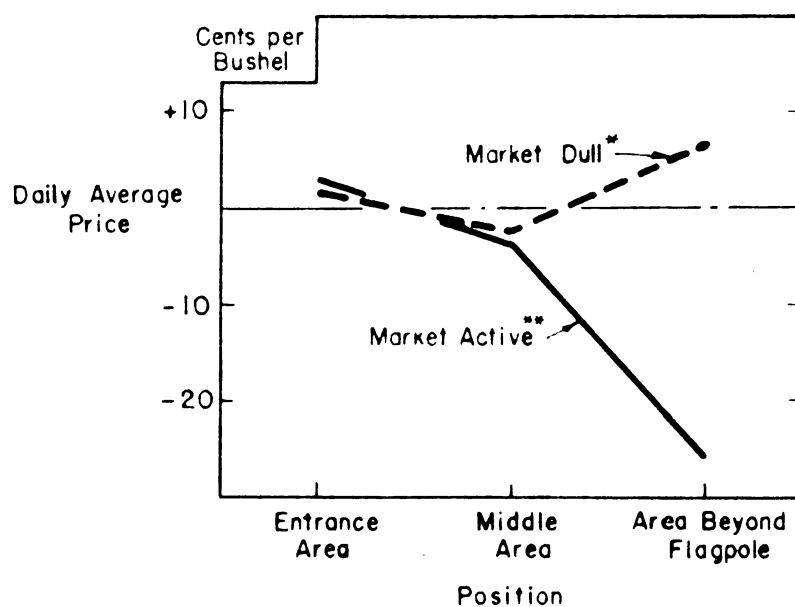


Figure 16. Effect of Position of the Seller on the Market on the Price of Halehaven and Elberta Peaches with Varying Market Activity.

\* Not Significant \*\* Significant at 2%

There was no significant difference in price of either variety of peaches due to the lane in which the sale was made. Since the sellers in the outside lanes receive as good a price as those on the center it might be advantageous for sellers who are forced into less favorable positions to pull around and enter the side lanes near the entrance again. The policy of allowing this has been followed on the market and is helpful to those farmers who feel they were forced to sell in an unfavorable position.

Many times the seller ends up at the back of the market due to a difference in his and the buyers opinion as to the quality of the peaches. If the quality was low, the farmer had more trouble selling his product because he was inclined to hold it for the average price. It must depend upon the individuals judgement of his product's quality as to whether he reenters the market after he has reached a less favorable position. If quality is low he will get a lower price in any position, but if quality is excellent, he may gain by going around and presenting his peaches where the most buyers are concentrated.

Effect of hour of sale on price. For the entire 1947 season, there was no significant difference in price during different hours of the day. However, on days when the market price movement was upward, the price advantage for afternoon sales was significant (Figure 17). The greatest price increase was after four o'clock.

On days that the market price movement was steady or downward,

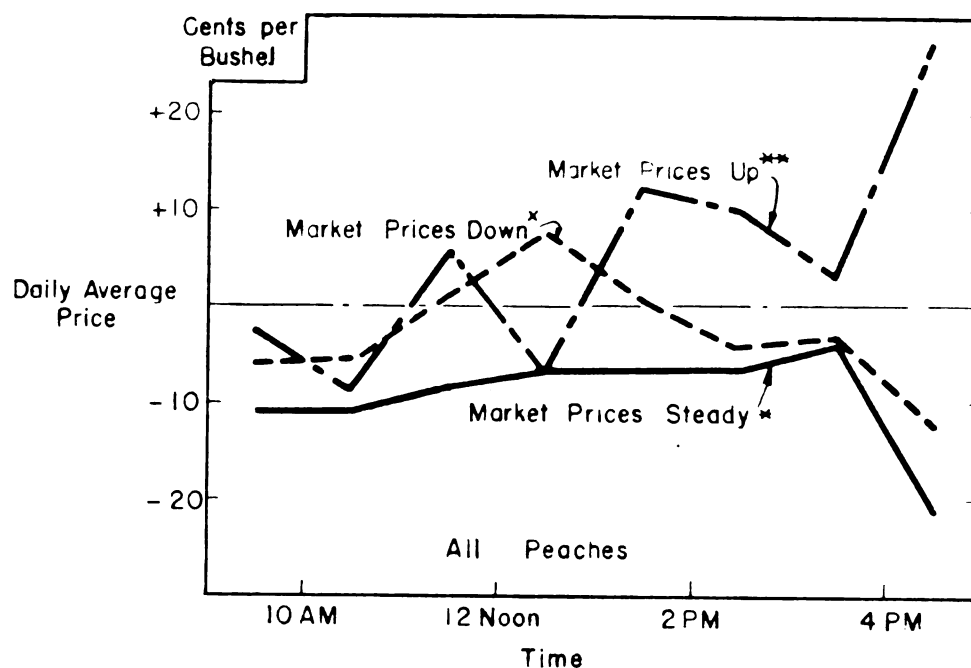


Figure 17 . Effect of Time of Sale on the Price of Halehaven and Elberta Peaches with Varying Market Price Movement.

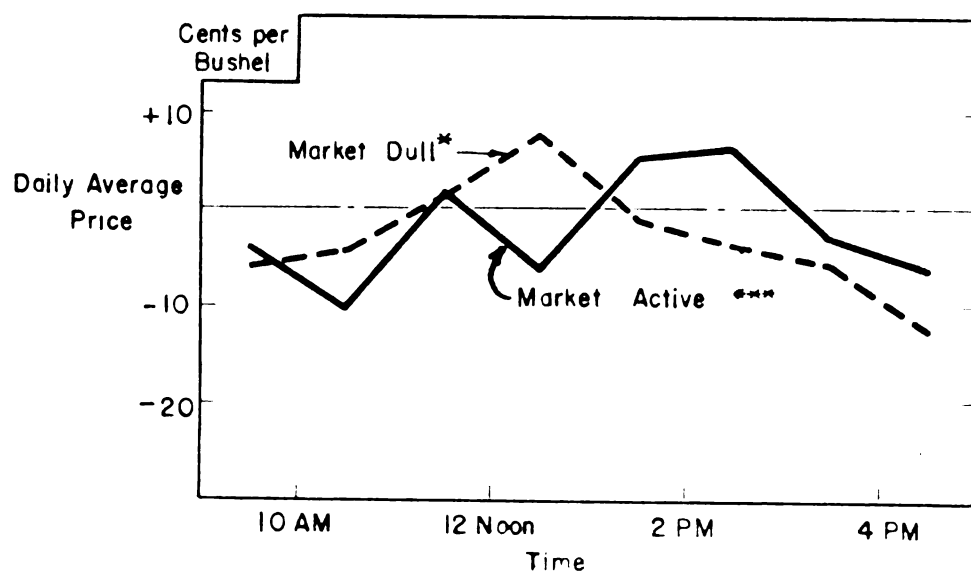


Figure 18 . Effect of Time of Sale on the Price of Halehaven and Elberta Peaches with Varying Market Activity.

\* Not Significant \*\* Significant at 1%  
\*\*\* Significant at 2%

there was no significant difference in price during different hours of sale. It appears, however, that there was some downward trend in prices after four P.M. on these days.

There was no significant difference in price due to the hour of sale when the market activity was dull. When the market was active, there was a significant difference in price with the afternoon sales prior to four o'clock showing the highest prices (Figure 18).

At present most of the producers time their marketing mostly by chance depending upon when the peaches are packed for marketing. A producer who was informed on market trends and correctly interpreted the market, received above average prices for his peaches. As soon as a large number of farmers take advantage of these price differences, the price advantage may be removed. Until a greater number of farmers act upon this information, it will pay the individual grower to watch particularly on active and rising markets for the most favorable hour of sale.

Effect of time spent in making sale on price. The grower who sold his peaches within the first hour received a better price than those growers who held their peaches for several hours before selling. In many cases the farmers who held out for higher prices were unable to get as high a price as their earlier offers. The longer the grower stayed on the market the more likely he was to have to sell from a less favorable position on the market. (See previous section).

There was a significant lowering of price corresponding to the longer time spent on the market on the days the market activity was dull (Figure 19). On days the market was active, there was no significant difference in price due to time spent on the market.

On days that market price movement was down there was also a discount in price to the grower who did not sell within the first hour (Figure 20). When the market price movement was steady or up, there was no significant difference in price due to time spent on the market.

Those farmers selling in the first hour received a price slightly better than the highest offer in the first round of bidding after they entered the gate (Table 1). As the length of time on the market increased, their chances of improving this offer became less. After they had been there on the market two hours or more, they took a price below their original offer.

A breakdown of the sales made within the first hour indicated that the farmers who sold within the first five minutes got less improvement in price over their first offer than those who held their peaches from five minutes to one-half hour. Those farmers who held their peaches for over a half hour received practically no increase over their first offer.

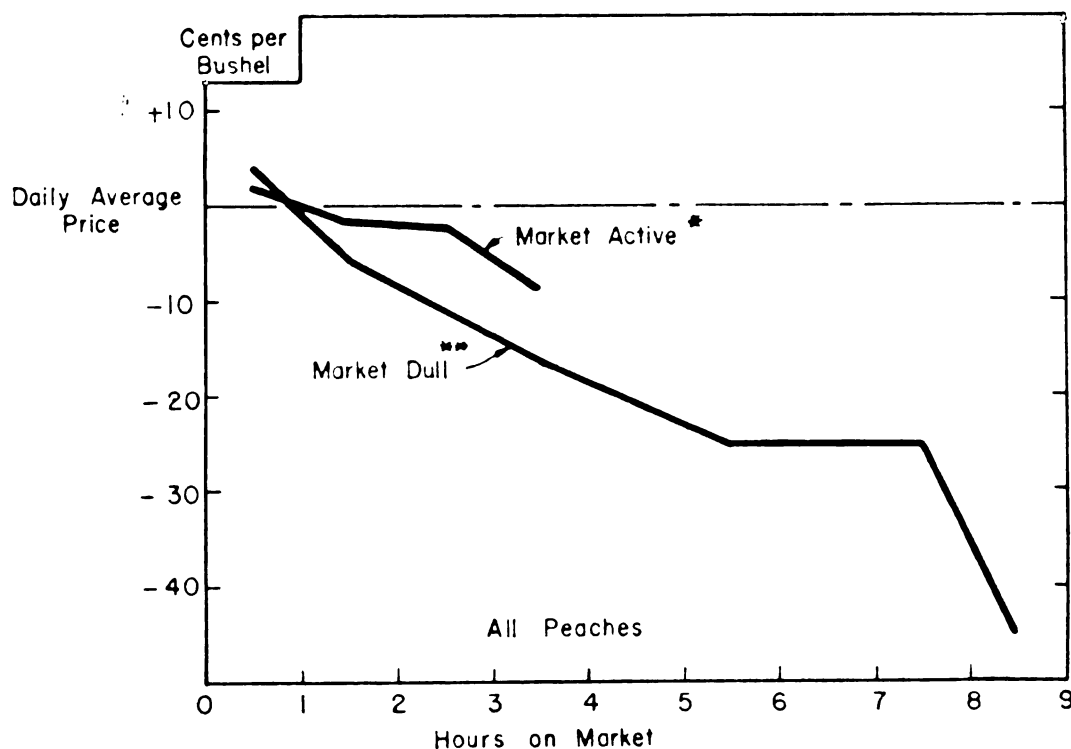


Figure 19 . Relationship between Time Spent in making Sale and Price with Varying Market Activity.

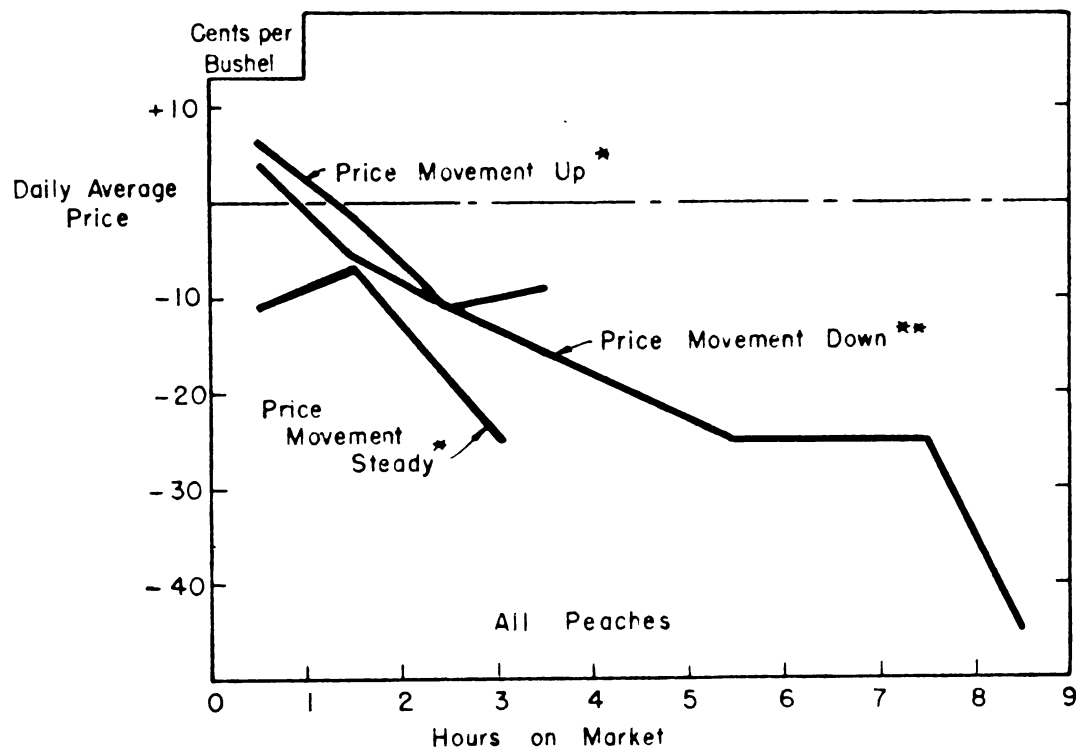


Figure 20 . Relationship Between Time spent in Making Sale and Price with Varying Market Price Movement.

\* Not Significant \*\* Significant at 1%



TABLE I

Average Gains over Early Offers Due to Holding of Peaches for a  
Higher Price

Time spent in making Sale	Highest Offer in 1st Round of Bidding	Final Sale Price	Cents per Bushel that Final price was above Offer
Up to 3 Min.	\$ 2.08	\$ 2.15	\$ .07
4 Min. to 30 Min.	\$ 2.03	\$ 2.14	.11
30 Min. to 1 Hr.	\$ 1.94	\$ 1.99	.05
1 Hr. to 2 Hrs.	\$ 1.74	\$ 1.76	.02
Over 2 Hrs.	\$ 1.76	\$ 1.62	- .14

Growers saved time and gained in price by selling within a reasonable period after entering the market. Each grower must depend upon his judgement to determine when the top offer has been made. The study indicated that the highest offer will usually be received within the first one-half hour after entering the market.

## CHAPTER VI

## OTHER NON-QUALITY FACTORS

Effect of number of packages on load on price. The size of the load of peaches offered by the producer had no significant effect upon the price received. Many of the smaller loads had poorer general appearance, but they brought the same price as large loads with the same general appearance. Although some buyers will not bother with small loads of less than twenty bushels, most buyers pay little attention to the size of the load.

Effect of type of container on price. There was no significant difference in price due to the type of container in which the peaches were sold. The conventional wooden bushel basket with a top and the 2200 cubic inch wooden box were observed in this study. The peaches packed in boxes had better appearance and brought better than average prices. They brought no more than peaches of like quality in bushel baskets. Since the boxes contained about five pounds less peaches and are somewhat easier to pack, the producers who used this package gained somewhat over those who packed in baskets.

Only about three percent of the peaches observed were packed in boxes. The market for these packages is limited, and it is possible that if more growers used this type of package their price might be forced down.

Effect of fullness of pack on price. The fullness of the pack had no significant effect upon the price of either variety of peaches. Fullness of pack was not associated with general appearance in either variety. The Elberta variety had more uniformity in fullness be-

cause they were usually more uniform in size. However, the lack of uniformity in fullness in the Halehaven variety had no effect upon the price.

Effect of sex of seller on price. The sex of the seller had no effect upon the price paid for the peaches. In both varieties of peaches about 90 percent of the sales were made by men. The quality of the peaches sold by men and women were about the same in both varieties.

Effect of the type of buyer upon the price. The Benton Harbor market has buyers who buy on a day to day fee basis and season buyers who rent a stall on a season basis and buy throughout the marketing season. There was no significant difference in the prices paid for a given quality of peaches by these two types of buyers. During the Halehaven season the day buyers studied, paid lower prices for the peaches they bought. These peaches were of poorer general appearance and lower average quality peaches than those purchased by the season buyers. In the Elberta variety the day and season buyers bought about the same quality of peaches and there was no significant difference in the prices paid.

The distance that the buyers carried or shipped the peaches had no effect upon the prices paid for a given quality of peaches. The buyers who shipped the peaches long distances bought somewhat better quality peaches.

## CHAPTER VII

### SUMMARY AND CONCLUSIONS

There are many causes for variations in peach prices. This study deals with an analysis of those differences in peach prices caused by the variations in the peaches and in the market. The sample included only those peaches marked U. S. No. 1, 2-inch and up in size and sold on the Benton Harbor Market during 1947. This grade and size classification included most of the peaches sold on this market.

The most important cause of price variations in the peaches studied was the general appearance. Buyers paid an average of 37 cents more for excellent than fair appearance in Halehaven peaches, and 16 cents more for excellent than fair appearance in Elberta peaches. The use of shredded paper on the facing, brushing and methods of accentuating the red on the face of the peach improved appearance. About 40 percent of the peaches observed had no shredded paper or cellophane on the facing and about 9 percent of the peaches were not brushed.

Another important factor causing variations in peach prices was the firmness of the peaches. Over one-half of the Halehaven peaches were marketed softer or riper than those that brought top prices. In the Elberta variety the situation was reversed. Here the buyers paid a premium for the riper peaches and less for the very hard ones. Since 93 percent of the Elberta peaches studied were marketed at the very hard state, there was wide room for improvement.

Defects caused price differences in both varieties of peaches. Bruises seemed to be the defect that caused the greatest discount in both varieties. Knots also caused lower prices. Buyers seemed to discount the defects which affected shipping quality most. Defects were not common in the Elberta variety as 95 percent of the peaches marketed showed no defects. Only 2 percent showed bruises. Only 81 percent of the Halehavens were free of defects, and 9 percent of the Halehavens marketed contained bruises, the most costly defect. This indicates a need for more careful grading, especially in the Halehaven variety.

Other quality factors studied had no direct effect upon price. Brushing of the peaches and an increase in percent of red on the face of the peaches improved appearance and thus indirectly improved price. Color of red and color of green had little effect upon either appearance or price.

The position upon the market had some effect upon price. There was no noticeable effect upon the Halehaven variety, but the fair and excellent quality Elbertas brought a lower price as the seller moved away from the entrance of the market. This same effect was noticeable on all peaches when the market price movement was about steady and when the market was active. These price differences are probably due to the different actions of the buyers on different days. The lane in which the peaches were sold had little effect upon price.

Over the 1947 season as a whole there was no significant difference in price due to time of sale. It was found that on days when the market price movement was up, the farmers who sold in the afternoon received significantly higher prices. When the market price movement was steady or down there was no difference in price due to time of sale.

Those farmers who held their peaches on the market for long periods hoping for a higher price usually were forced to take less than their original offers. Any holding of the peaches over one-half hour brought little increase in price. The length of time that the farmer waited to sell was most important on days when the market price movement was down.

Other nonquality factors such as type of buyer, type of package, size of load, and sex of seller were studied and found to have no effect upon price.

The results of this study indicate that the majority of the factors causing price variations within standard grades of peaches may be controlled by the farmer. It is up to the individual producer to determine if the expected price increases will compensate him for his added work.

## DEFINITION OF TERMS

General Appearance : The overall appearance of the package of peaches when viewed with the top off.

Excellent - Those peaches with above average appearance, good size, bright color, and attractive facing and package.

Good - Peaches which look to be of average size and color with no special attempt to make pack neat and attractive.

Fair - Poor color and quality readily apparent with peaches appearing small or irregular. Usually contained defects and no effort had been made to make pack attractive.

Color of Green : The shade of green that appeared on the peach.

Light - Very light green bordering on yellow over most of the area covered. (Ripest peaches)

Medium - Normal green color with little or no yellow shading apparent.

Dark - Heavy grass color usually very dull. (Greenest peaches)

Color of Red : The shade of red that appeared on the face of the peaches on the top of the basket.

Light - Slight tinge of red bordering on yellow shading.

Medium - Normal brick red shade with little yellow shading.

Dark - Heavy red bordering on purple, usually dull in color.

Firmness : Ripeness of the peaches as judged by feeling of them.

Very hard - No denting under medium thumb pressure.

Firm - Firm to grasp but would dent under thumb pressure.

Soft - Skin of peach felt somewhat loose. Dents appeared under normal hand pressure. Flesh of peach felt loose and movable.

Type of Paper Used on Facing : Type, if any, of loose shredded paper, used on the face of the peaches in the bushel baskets to improve appearance.

Cellophane - Small strips of cellophane about one-eighth inch in width and six inches long. Usually was white, red, or green in color.

Colored Paper - Strips of colored paper about one-fourth inch wide and four inches long. The colors used most were red, green, and dark purple.

None- Nothing added to basket facing.

Type of Package :

Bushel Basket - Conventional bushel basket with top.

Box - 2200 cubic inch wooden box. The boxes held about 5 pounds less peaches than a bushel basket.



Significance : Results of statistical tests to show effect of various factors.

Significant at 1 percent - Observed action was caused by factors other than chance at least 99% of the time.

Significant at 2 percent - Observed action was caused by factors other than chance at least 98% of the time.

Not Significant - Any observed differences may be due to chance.

Market Price Movement : General movement of average prices during the day.

Up - When the daily average price is above that of the previous day by ten cents per bushel or more.

Steady - When the daily average price is within ten cents per bushel of that of the previous day.

Down - When the daily average price is below that of the previous day by ten cents per bushel or more.

Market Activity : Whether sales were slow or fast.

Active - Buyers showed interest in all loads of peaches. The market area was generally kept clear. Buyers engaged in spirited bidding for quality produce.

Dull - Buyers showed little interest in all but the top quality peaches. Very little competitive bidding. Market area was usually congested with peaches.

Type of Buyer : Classification of the buyers according to market records.

Day buyers - Those buyers who pay market fees and are assigned loading stalls on a day to day basis.

Season buyers - Those buyers who pay market fees and are assigned stalls for an entire season.

Fullness of Package : Estimate of the top face of the peaches as compared to the rim of the basket.

## APPENDIX A

Character of the Peaches Marketed on the Benton  
Harbor Market from September 1 to September 23, 1947.

General Appearance

	Halehaven Elberta Percent	
Excellent	46	57
Good	47	36
Fair	7	7

Softness

	Halehaven Elberta Percent	
Very Hard	46	93
Firm	46	6
Soft	7	1
Very Soft	1	0

Fullness of Pack

	Halehaven Elberta Percent	
0	7	2
$-\frac{1}{2}$ inch	70	96
-1 inch	23	2

Defects

	Halehaven Elberta Percent	
Rot	0	1
Bruise	9	2
Bruise & rot	1	0
Knotty	3	1
Wormy	1	0
Rot & Knotty	0	0
Bruise & Knotty	1	0
Bruise, rot, & Knotty	0	0
Other	4	1
None	81	95

Size

	Halehaven Elberta Percent	
2 inch & up	94	100
2 $\frac{1}{4}$ inch & up	6	0

Color of Green

	Halehaven Elberta Percent	
Light	44	20
Medium	42	47
Dark	14	33

Color of Red

	Halehaven Elberta Percent	
Light	28	54
Medium	47	39
Dark	25	7

Brushed

	Halehaven Elberta Percent	
Yes	91	92
No	9	8

Use of Paper Covering on Face

	Halehaven Elberta Percent	
Cellophane	10	9
Colored paper	47	51
None	43	40

## (APPENDIX A CONTINUED)

<u>Sex of Seller</u>			<u>Type of Package</u>		
	Halehaven	Elberta		Halehaven	Elberta
	Percent			Percent	
Male	92	90	Bushel		
Female	8	10	Basket	97	97
			2200 cu. in.		
			Box	3	3

<u>Type of Buyer</u>		
	Halehaven	Elberta
	Percent	
Season	55	81
Day	45	19

## APPENDIX B

Date \_\_\_\_\_ Lane \_\_\_\_\_  
 Time \_\_\_\_\_ Michigan State College Offered \_\_\_\_\_ Asked \_\_\_\_\_  
 Price \_\_\_\_\_ Agricultural Economics Section Position \_\_\_\_\_  
 1-2-3-4-5-6

Name of Grower \_\_\_\_\_ City \_\_\_\_\_ M - F \_\_\_\_\_

Variety \_\_\_\_\_ General Appearance: Ex \_\_\_\_\_ Good \_\_\_\_\_ Fair \_\_\_\_\_ Poor \_\_\_\_\_

Grade and Size: \_\_\_\_\_ Color of Red: D \_\_\_\_\_ M \_\_\_\_\_ L \_\_\_\_\_ % \_\_\_\_\_  
 \_\_\_\_\_ Color of Green: D \_\_\_\_\_ M \_\_\_\_\_ L \_\_\_\_\_

No. of Packages on Load: \_\_\_\_\_ Softness: 1 - 2 - 3-4 \_\_\_\_\_  
 Pkg. and Type of Liner: New \_\_\_\_\_ Old \_\_\_\_\_

Shredded Paper: \_\_\_\_\_ Rots \_\_\_\_\_ Worm \_\_\_\_\_ Bruise \_\_\_\_\_  
 Defects: Knotty \_\_\_\_\_ Other \_\_\_\_\_

Full Pack -  $\frac{1}{2}$  - 0 $\frac{1}{2}$  - 1 - 1 $\frac{1}{2}$  - 2 - 2 $\frac{1}{2}$  \_\_\_\_\_ Brushed: Yes \_\_\_\_\_ No \_\_\_\_\_

Name of Buyer \_\_\_\_\_ Degree of Inspection \_\_\_\_\_

General Comments: \_\_\_\_\_

Data Card Used in 1947 Peach Price Study  
on the Benton Harbor Wholesale Fruit Market.

## APPENDIX C

I. B. M. Code for Peach Price StudyCard No. (Line 1, 2, 3) - From 001 - 382Time of Sale (Line 4,5)

1.1 - 1.9 - 0901 - 1000  
 2.0 - 2.9 - 1001 - 1100  
 3.0 - 3.9 - 1101 - 1200  
 4.0 - 4.9 - 1201 - 1300  
 5.0 - 5.9 - 1301 - 1400  
 6.0 - 6.9 - 1401 - 1500  
 7.0 - 7.9 - 1501 - 1600  
 8.0 - 8.9 - 1601 - 1700  
 9.0 - - 1700

Minutes are designated to  
nearest tenth of hour.

Where two times are given the  
second (time of sale) will be  
used.

Time on Market in Hours (Lines 6,7)Time in hours

01 - 0.1  
 02 - .2  
 03 - .3

Available only where two times  
are given.

Prices (Lines 8, 9, 10)

Actual price indicated.

Lane (Line 11)

As marked on pavement of market.

Offered (Lines 12, 13, 14)

As listed at time of offer.

Asked (Lines 15, 16, 17)

As listed at time of offer.

Position (Line 18)

- 1 - First  $\frac{1}{2}$  of market.
- 2 - Second  $\frac{1}{2}$  of market.
- 3 - Area between flagpole and cold storage.
- 4 - 6 - Same as above on second time around.

Name of Grower (Lines 19, 20, 21)

001 - 242, as taken from alphabetical listing.

City (Lines 22, 23)

- |                      |                     |
|----------------------|---------------------|
| 01 - Bangor          | 11 - Niles          |
| 02 - Baroda          | 12 - Riverside      |
| 03 - Benton Harbor   | 13 - Sodus          |
| 04 - Berrian Springs | 14 - Stevensville   |
| 05 - Buchanan        | 15 - St. Joseph     |
| 06 - Coloma          | 16 - Watervliet     |
| 07 - Dowagiac        | 17 - Berrian Center |
| 08 - Eau Claire      | 18 - South Haven    |
| 09 - Hartford        | 19 - Galien         |
| 10 - Millburg        |                     |

Sex of Seller (Line 24)

- 1 - Male
- 2 - Female

Variety (Line 25)

- 1 - Halehaven
- 2 - Elberta
- 3 - Golden Elberta
- 4 - South Haven

General Appearance (Line 26)

- 1 - Poor
- 2 - Fair
- 3 - Good
- 4 - Excellent

Grade and Size (Line 27) (All U. S. No. 1)

- 1 - 1 3/4 " and up
- 2 - 2" and up
- 3 - 2 1/4" and up

Color of Red (Line 28)

- 1 - Dark
- 2 - Medium
- 3 - Light

Percent of Red (Line No. 29)

- 2 - 20%
- 3 - 30%

Color of Green (Line 30)

- 1 - Dark
- 2 - Medium
- 3 - Light

Softness (Line 31)

- 1 - Very hard
- 2 - Hard
- 3 - Soft
- 4 - Very soft

Defects (Line 32)

- 1 - Rot
- 2 - Bruise
- 3 - Bruise and rot
- 4 - Knotty
- 5 - Wormy
- 6 - Rot and knotty
- 7 - Bruise and knotty
- 8 - Bruise, rot and knotty
- 9 - Other
- 0 - None



Brushed (Line 33)

- 1 - Yes
- 2 - No

Number of Packages on Load (Lines 34, 35, 36)

Actual number.

Type of Package (Line 37)

- 1 - Bushel basket
  - 2 - Bushel box
- All boxes were 2200 cubic inches and held about 5 pounds less peaches than a bushel basket.

Type of Paper on Face of Bushel (Line 38)

- 1 - Cellophane
  - 2 - Colored
  - 3 - None
- All U. S. No. 1 peaches in bushel baskets were ring faced to some degree. All bushel boxes were faced in rows.

Fullness of Pack (Line 39)

- 1 -  $-\frac{1}{2}$  inch
  - 2 - 0 "
  - 3 -  $-\frac{1}{2}$  "
  - 4 - -1 "
- All measurements from top edge of box or basket.

Type of Buyer (Line 40)

- 1 - Season buyer
- 2 - Day buyer

Type of load carried by Buyer (Line 41)

- 1 - Straight load of peaches
- 2 - Mixed load of fruit
- 3 - Mixed load of fruit and vegetables

Distance carried by Buyer (Line 42)

0 - Up to 100 miles	5 - 500-600 miles
1 - 100-200 miles	6 - 600-700 miles
2 - 200-300 miles	7 - 700-800 miles
3 - 300-400 miles	8 - 800-900 miles
4 - 400-500 miles	9 - 900 miles and over

Market Activity (Line 46)

1 - Dull	(As observed)
2 - Active	

General Market Price Movement (Line 47)

1 - Up	(As observed)
2 - Steady	
3 - Down	

Number of Day Buyers (Lines 48, 49, 50)

Actual number as listed in Federal State Market News Service Report.

Volume of Sales (Lines 51 & 52) To nearest 1000 bushels.

As taken from Federal State Market News Service Report.

Temperature (Line 53 & 54)

Actual temperature to the nearest degree from the noon reading at the market clerk's office.

Average Price of 2" and up Halehaven Peaches (Lines 55, 56, 57)

As taken from the Federal State Market News Service Report.

Average Price of 2" and up Elberta Peaches (Line 58, 59, 60)

As taken from the Federal State Market News Service Report.

Date (Lines 62 & 63)

02	Monday, September	1
03	Tuesday	2
04	Wednesday	3
05	Thursday	4
06	Friday	5
11	Sunday	7
12	Monday	8
13	Tuesday	9
14	Wednesday	10
15	Thursday	11
16	Friday	12
22	Monday	15
23	Tuesday	16
24	Wednesday	17
25	Thursday	18
26	Friday	19
31	Sunday	21
32	Monday	m22
33	Tuesday	23

Variation from Daily Average Price (Lines 64, 65, 66)

Difference between price received and daily average price.

## APPENDIX D

## The Use of the F Test of Significance

The F test of significance is used to determine whether the differences appearing in a series are due to causes other than chance. This is done by a comparison of the variance ( $\sigma^2$ ) between groups and the variance ( $\sigma^2$ ) within groups.

In the following example these symbols are used:

- $N$  = Total number of cases.  
 $n$  = Number in each group.  
 $g$  = Number of groups.  
 $X$  = Cents per bushel variation  
 from daily average price.  
 d.f. = Degrees of freedom.

The formula for F is as follows:

1. Total variation or sum of the squared deviations =  $\frac{\sum x^2}{N} - \frac{(\sum x)^2}{N}$  Total d.f. =  $N - 1$
2. Between variation groups or sum of the squared deviations =  $\sum \frac{(\sum x)^2}{n} - \frac{(\sum x)^2}{N}$  Between groups d.f. =  $g - 1$

Subtract equation 2 from equation 1 to find within groups variations. It's degrees of freedom is  $N - g$ .

The variance ( $\sigma^2$ ) between groups is equal to the between groups variation divided by its degrees of freedom. The variance ( $\sigma^2$ ) within groups is equal to the within groups variation divided by its degrees of freedom.

$$F = \frac{\text{Larger Variance}}{\text{Smaller Variance}}$$

F Test Applied to General Appearance of Elberta Peaches

## General Appearance

	Fair	Good	Excellent
$n$ = number of cases	13	64	102
$\sum x$ = Sum of price variations from average	-162	-564	320
$\frac{(\sum x)^2}{n}$ =	2018.76	4970.25	1003.92

$N =$  Total number of cases = 179

$\sum x^2 =$  Sum of squares of each individual price variation  
from daily average price = 95,956.

$(\sum x)^2 =$  Sum of the total price variation for entire  
group squared = 164,836.

Source	Variation	Degrees of Freedom	Variance
Total	94,035.13	178	
Between Groups	7,071.13	2	3535.57
Within Groups	86,964.00	176	494.11

$$F = \frac{3535.57 \text{ (B.G.)}}{494.11 \text{ (W.G.)}} = 7.16$$

Consulting the F table we find the figure for 2 and 176 degrees of freedom to be 3.09 at the one percent level. Since 7.16 is above this figure the differences observed are due to causes other than chance more than 99 percent of the time.

## APPENDIX E

Use of the  $\chi^2$  Test to Show Association

The  $\chi^2$  test is used to show association between two factors by comparing their theoretical frequencies with the frequencies actually observed.

To illustrate the  $\chi^2$  test we shall use the association between brushing and general appearance in the Halehaven variety.

<u>General Appearance</u>	<u>Observed</u>		<u>BRUSHED</u>			<u>Expected</u>	
	<u>Yes</u>	<u>No</u>	<u>Total</u>	<u>Yes</u>	<u>No</u>	<u>Total</u>	
Excellent	69	4	73	65.7	7.3	73	
Good	58	7	65	58.5	6.5	65	
Fair	8	4	12	10.8	1.2	12	
Total	135.0	15.0		135.0	15.0		

The expected theoretical frequency is found by applying the same ratio or proportion to each grouping as is found in the entire group. In this case the ratio is nine to one.

$$\text{The formula is } \chi^2 = \sum \frac{(f - f_i)^2}{f_i}$$

$f$  = actual frequency                       $P$  = number of rows

$f_i$  = theoretical frequency               $Q$  = number of cells in row

$$\begin{aligned} \chi^2 = & \frac{(69-65.7)^2}{65.7} + \frac{(4-7.3)^2}{7.3} + \frac{(58-58.5)^2}{58.5} + \frac{(7-6.5)^2}{6.5} + \\ & \frac{(8-10.8)^2}{10.8} + \frac{(4-1.2)^2}{1.2} = 5.86 \end{aligned}$$

The degrees of freedom =  $(P-1) (Q-1)$  or in this case the degrees of freedom =  $(2-1) (3-1) = 2$

Entering the table with values of 2 we find that with two degrees of freedom the value of 5.86 would fall between the .05 and .10 level. This means that such a divergence from the theoretical could occur between 5% and 10% of the time. This means that brushing is not significantly associated with general appearance in the Halehaven variety.

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