The projected retail prices, adjusted for increases in the general price level, of fresh oranges and frozen orange concentrate and single strength orange juice are approximately 80 percent of the average prices for the period 1952-1963. Thus, consumers in 1975 may have to pay 20 percent less per unit for fresh oranges and orange products than they paid during the period covered by this study.

Projected consumption, using the 1975 projected prices and income and 1952-1963 averages for an average four-week period, is shown in Table 4. Fresh oranges show the greatest percentage increase in projected per capita consumption for 1975. This is due to the greater price elasticity for fresh oranges. Thus, as prices reduce the consumer responds by buying larger amounts.

**Summary**

The analysis conducted in this overall project indicates that fresh oranges and single strength canned juice have an elastic demand and orange concentrate has approximately unit elasticity at retail. Simple interpretation of these coefficients means that reducing prices to move larger volumes will give greater total dollar sales for fresh oranges and single strength juice with little change in the total dollar sales for orange concentrate. This implies that activities such as greater promotional efforts rather than reducing price should be the more profitable action to take in moving larger quantities of frozen concentrate through retail markets.

**LITERATURE CITED**


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**CANNED GRAPEFRUIT SECTIONS AND CANNED CITRUS SALAD, AS AFFECTED IN FINAL DRAINED WEIGHT AND QUALITY BY VARIATIONS IN RAW FRUIT BRIX DURING THREE PACKING SEASONS**

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**INTRODUCTION**

Canned citrus sections are annually accounting for approximately 20 percent of all grapefruit processed in the State of Florida, and are a definite factor contributing to profitable returns to the grapefruit grower.

Quality of canned citrus sections is influenced thru raw fruit by a complex of factors, some of which have been investigated (1, 3, 4, 5).

The purpose of this paper is to draw attention to the Brix of the raw fruit as a prime factor influencing the quality of canned citrus sections.

The data presented, covers the total production of 1,600,000 cases (equivalent 24-No. 2) canned grapefruit sections and canned citrus salad, produced by our company in two plants during three packing seasons, 1960-61; 1961-62; and 1962-63. The data, relating to the canned product, is derived from analyses of 16,000 cans, made and recorded during routine quality control checks and U.S.D.A.—A.M.S. probable and final grading inspections, as a part of continuous inspection. Florida Department of Agriculture state inspection analyses on 3,000 individual fruit loads of seeded varieties of grapefruit used in production, supplied the raw fruit Brix data.

**PROCESSING METHODS**

The canned sections represented by the data, were packed, using commercial procedures common in the State of Florida at the time of packing (2). Steam scalding, mechanical peeling, lye
peeling and hand sectionizing into presyruped cans were used. The cover syrup was composed of 50 percent solids from dry sucrose, and 50 percent solids from corn syrup 55DE, 43 Be. For very short periods, early each season, higher percentages of sucrose were used. The cans were closed by steam flow closure, heated submerged in hot water continuous cookers to 175° F. center temperature, cooled to 95° F. by submerging in continuous tap water coolers. The product was cased mechanically.

The drained weight information presented here, covers only the whole section style of pack, and does not include data on the broken section style.

**Interpretation and Results**

A graph for each season, Figures 1, 2 and 3, shows for 303 cans:

1. Weekly averages for drained weight of unprocessed sections placed in cans (put-in weight).
2. Weekly averages of drained weight of sections immediately after processing and cooling (probable grading).
3. Weekly averages of drained weight two weeks after processing (final grading).
4. A record of Brix of cover syrup used.
5. Weekly averages of cut-out Brix two weeks after processing.

The bulk of the data represents only canned grapefruit sections. The usual relatively small pack of canned citrus salad was made during the last few weeks of the 1960-61 and 1961-62 seasons, and since this product is predominantly grapefruit (55 percent), the data for the two products are included together.

Study of Figure 1 for the 1960-61 season, reveals several interesting points:

1. A very high initial put-in weight in the beginning of the season.
2. Low raw fruit Brix corresponding to high put-in weights.
3. A consequent large loss of weight during processing, as seen by the distance between the two uppermost curves early in the season, gradually lessening as the season progresses.
4. The ability to decrease cover syrup Brix and drained weights before processing, as the raw fruit Brix increased.
5. The cut-out Brix, or indication of total solids content of the cans remained relatively constant throughout the season.

Figure 2 for the 1961-62 season shows the following:

1. During this season, a much lower put-in weight is reflected in comparison to the previous season, 1960-61, (Figure 1).
2. At the same time, a relatively low weight loss during processing is evident.
3. It can be seen that the raw fruit Brix is significantly higher than the previous season, averaging 1.7 degrees above that of the previous season.
4. As the raw fruit Brix increased, the cover syrup volume per can was increased, and the cover syrup Brix was decreased. This allowed quite a drop in put-in weight before processing, without dropping below the 9.5 ounces, the final drained weight minimum for Grade A.

The season, 1962-63, Figure 3, is similar in nearly every respect to the first season, 1960-61, (Figure 1), and serves as a confirmation of data for that season. The raw grapefruit Brix for this season, 1962-63, (Figure 3), averaged almost two degrees Brix below that of the previous season, 1961-62, (Figure 2).

Table 1 compares the three seasons, with respect to: 1. Average Raw Grapefruit Brix, 2. Percent Final Grade A Packed, 3. Drained Weight loss through processing to Final Grading, and 4. Recovery of grapefruit sections in equivalent No. 2 cans per standard 85 pound box of grapefruit received for sectionizing.

The table shows a definite relationship between raw grapefruit Brix and 1. product quality or grade, 2. the loss of section drained weight, or "bleed out" and consequently, 3. the economic factor of recovery.

It can be seen that as Brix increases, percent Grade A increases, while drained weight loss decreases, causing recovery to increase.

**Conclusion**

In canned grapefruit sections and canned citrus salad, high Brix in the raw grapefruit favorably influences product quality thru the firming of section character, and influences economic recovery, thru depressing the drained weight loss during and after processing.

It is believed that more specific work in this area would be of benefit to the processor and grower alike.
Figure 1.
CARTER: DRAINED WEIGHT—QUALITY STUDIES

BEFORE PROCESSING

AFTER PROCESSING

TWO WEEKS AFTER PROCESSING

COVER SYRUP BRIX

CUT OUT BRIX

RAW FRUIT BRIX

CANNED SECTIONS
1962-63 SEASON
303 CANS

Figure 2.
CANNED SECTIONS 1961-62 SEASON

303 CANS

Figure 3.
TABLE 1
COMPARISON CANNED CITRUS SECTIONS FOR THREE SEASONS

<table>
<thead>
<tr>
<th>SEASON</th>
<th>RAW FRUIT BRIX GRAPEFRUIT</th>
<th>PERCENT GRADE A</th>
<th>DRAINED WEIGHT LOSS OUNCES - BEFORE PROCESSING TO TWO WEEKS AFTER PROCESSING</th>
<th>RECOVERY NO. 2 CANS PER BOX GRAPEFRUIT</th>
</tr>
</thead>
<tbody>
<tr>
<td>1960-1961</td>
<td>10.30</td>
<td>91.8</td>
<td>3.29</td>
<td>33.33</td>
</tr>
<tr>
<td>1961-1962</td>
<td>12.00</td>
<td>95.5</td>
<td>1.98</td>
<td>35.54</td>
</tr>
<tr>
<td>1962-1963</td>
<td>10.06</td>
<td>88.9</td>
<td>3.37</td>
<td>31.35</td>
</tr>
</tbody>
</table>

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SEED OILS FROM FLORIDA MANDARINS AND RELATED VARIETIES

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The scientific literature contains very little information on mandarin seed oils. Seed oil has never been produced commercially from these fruits in any of the citrus regions of the world, undoubtedly because so few mandarins are processed. In Florida, mandarin seed oil has received little attention, despite the fact that, during the 1961-62 season (6), 29 percent of the harvested tangelos (285,000 boxes), 31 percent of the tangerines (1,235,000 boxes), and an unspecified quantity of Temple oranges were processed. If all seeds had been recovered from these fruits, approximately 300,000 pounds of mandarin seed oil could have been produced. This investigation has sought, therefore, to examine the potential commercial aspects of mandarin seed oils and to study the physicochemical seed oil changes related to maturation and senescence, consequently making available information on the characteristics of mandarin seed oils.

The only literature reference to Florida mandarin seed oil was that of Swift (10) who, in 1949, extracted the seed oil from Dancy tangerine seeds. This seed oil was reported as having a density of 0.9168 at 25°C/25°C, a refractive index of 1.4698 at 25°C, and an iodine number of 107.4. The reported fatty acid composition is shown later in Table 3, while the percentage of oil found in the dried seeds was 26.6 percent.

In India, the seeds from Calamondin fruit