Members and friends of the Florida State Horticulture Society: Since your society is comprised of experts and technical men versed in every phase of growing and processing of citrus products, I will direct my discussion to the consumers of our "Cinderella Product" Frozen Orange Concentrate.

Dear Consumer, whenever we overproduce and our markets show signs of weakness, we delight in telling the world that the quality of our products is to blame. Being modest, we never tell you that the Florida Citrus industry has done more to improve the quality of its products than any other I know of. Were you ever told that Florida is the only state in the Union that has a law to protect the consumer of its citrus products? This law, known as the Florida Citrus Code, is policed by a staff of some five hundred Federal-State Inspectors. It guarantees every user of Florida Frozen Orange Concentrate the following: A glass of orange juice extracted from sound mature oranges; that it is pure orange juice without sugar or any other additives; that it contains fruit solids equivalent or exceeding that of the original fruit used; that it does not contain excessive peel oil and other defects; that it is packed under sanitary conditions from wholesome fruit, and that it is an acceptable product in both color and flavor.

This law does not protect you against possible deterioration or even spoilage due to improper handling and storage. Frozen Orange concentrate must be handled like any other perishable frozen product; actually it requires even colder temperatures due to its high fruit solids. Too many consumers take advantage of quantity sales that do not have adequate freezer storage for their purchases. Small wonder that the product thaws and loses much of its freshness and bouquet, or in extreme cases becomes totally unfit for use.

However, my topic of discussion deals with those variations in quality that exist in Orange Concentrate under normal conditions. The phenomenal growth of the Frozen Concentrate industry proves my point that Florida has produced, as a whole, a very satisfactory product. I will not try to prove that our product does not vary in quality. To produce this years' record pack of sixty five million gallons of concentrate we utilized fifty million boxes of oranges. Were these oranges uniform in color and flavor? Of course not! These oranges varied in quality mainly because they were not of one variety; they varied in quality to a lesser degree because they were grown in various groves with different types of soil; they grew under different climatic conditions; they had different fertilizer and spray applications; they were grown on young and old groves; they were harvested over a period of seven months; and even the oranges picked off the same tree varied in quality depending on the amount of sunlight the individual orange was exposed to.

You consumers are entitled to know that we grow three different crops of oranges in Florida, all of which contain an abundance of vitamin C and other health giving properties. However, these varieties do have distinct variations in color and flavor. Our early varieties of oranges harvested in October and November produce an orange juice rich in vitamin C, pale yellow in color, and bland in flavor. Our mid-season oranges harvested during December through February produce a juice with a more desirable yellow orange color, and more distinct orange flavor. Our late variety, Valencia Oranges, are harvested during March through June and give us our finest Frozen Orange Concentrate. The juice of these oranges with its deep orange color and rich orange flavor can not be excelled.

Our early packs of Frozen Orange Concentrate were made entirely from Valencia Oranges, as our industry grew we utilized our mid-season oranges, and now of course some concentrate includes at least a percentage of the early varieties. I hope that this explains much of the variations you find in our product; normal variations found in the fruit we use. However, here, again I am proud of the many steps the industry has taken to minimize these differences. Blending of oranges to give you
the very best product possible has become an exacting science. If you extract orange juice at home, at the best, you will have the blend of probably a dozen oranges, whereas the can of frozen orange concentrate you purchase will contain a blend of juices taken from tens of thousands of oranges. Oranges that have been tested prior to picking so that the processor can mix these in such proportions as to give you the most uniform end product possible. Not satisfied with blending various fruit at the time it is harvested the industry has even gone a step further for the sake of uniformity. Some processors rather than give the consumer a product that varies in color and flavor depending on variety of oranges in season; concentrate the orange juice, keep it frozen in bulk containers, and at a later date add this back to blend with another variety, in this manner narrowing the range in color and flavor found between the early fruit and our Valencia Orange.

To a lesser degree methods of processing also affect the quality of frozen orange concentrate. Since some of our consumers are not familiar with the methods of manufacturing, I will give a short story on this first. Oranges are harvested and brought to the concentrate plant. Federal-State Inspectors draw samples from each load of oranges and test for sugar solids, acidity and juice content. Each load of oranges is stored in an individual bin and tagged with the information furnished by the Fresh Fruit Inspectors. The processor then blends fruit from various bins to keep a uniform ratio of fruit solids to acidity. This blend of oranges is conveyed through various washers and germicidal sprays to make the outside of the fruit as clean and free of bacteria as possible. The fruit passes over a grading table and all damaged oranges are eliminated. Sound fruit moves into mechanical extractors that remove the orange juice. The orange juice passes through finishers which remove any seeds or large particles of pulp, and finished juice is pumped into a cold storage tank from which it is fed into evaporators. These evaporators are kept under such high vacuum that the orange juice actually boils at a lower temperature than that of the outside air. This is part of the secret of the fresh flavor of this product. However, much of the flavor and bouquet of the orange juice is also evaporated with the water. Consequently the orange juice is concentrated above the point of the final product, thus allowing for the addition of some thirty percent fresh orange juice to the concentrated portion. This addition of juice, which has not been subject to evaporation, restores the fresh orange flavor and aroma to the finished product.

Federal inspectors are stationed in the plant to test the finished product. If it complies with all the requirements of the Florida Citrus Code the processor is allowed to can the finished product. Usually the concentrate is brought down to a temperature just above the freezing point by means of cold wall blending tanks and votators. After the cans are filled and sealed they pass through a freezer tunnel where blasts of subzero air freeze the product. It is then cased, and stored at subzero temperature. This entire operation is mechanical and human hands only touch that fruit which is eliminated at the grading tables. The entire operation is continuous. Tree ripened fruit harvested in the morning is converted into frozen orange concentrate ready for consumption within hours of the time it leaves the groves.

The minor variations in quality because of processing are due to these points; the actual selection of available fruit; the degree of sanitation maintained in the plant; the yield of orange juice (the processor may over extract the oranges and obtain some of the bitter flavors from the peel, seeds and pulpy portion of the orange); the temperature that the evaporators are operated at (to increase production he may operate at slightly higher temperatures thus increasing evaporation); the degree to which the orange juice is concentrated (the higher concentration allowing for a larger proportion of fresh juice to be added to the finished product); the speed at which the product is frozen; and of course the storage temperature and care of handling to the time the product is consumed.

There is one point that I will touch upon, and this one is so controversial that I have saved it for the last. The concentrate you purchase is of such strength that you add three parts of water to one part concentrate. This returns to the product the amount of water that was evaporated, giving you a drink of pure undiluted orange juice. This ratio of three to one was chosen for several reasons. Three parts of water are ample to thaw the one part of frozen concentrate and by the same token the frozen concentrate chills the
reconstituted juice to proper drinking temperature. Secondly, this allows the processor to concentrate the juice to approximately fifty-five percent fruit solids and then reduce to forty-two percent with the addition of one-third fresh orange juice. However, after this concentration was adopted and made part of the Florida Citrus Law it was discovered that the product at this concentration if abused in storage had the optimum portions of fruit sugars, acid and pectin to cause gellation. Once the product gelled no amount of stirring or agitation would make it reconstitute back properly with the addition of water. All of the vast number of technical men associated with the industry were put to work on this problem. The outcome of this research was this: that by flash heating that portion of the orange juice that went to the evaporators to a temperature of approximately 60° Fahrenheit sufficient enzymes were inactivated to greatly reduce gellation in the finished product. The controversy is whether this application of heat impairs the fresh flavor of the finished product. It is my feeling that too much of an issue has already been made on this subject. Too many of the arguments have been based on the individual’s approach to the problem rather than on the actual facts, consequently exaggerated claims have been made on both sides of the issue.

In conclusion; it has been my lot to taste test samples of orange concentrate from all segments of the industry since its conception and I can still say that as a whole all of Florida Frozen Orange Concentrate is a very satisfactory product! Differences in quality are mainly due to the difference in the varieties of fruit we use; to a lesser degree to the differences in our actual production procedures. Our entire industry is to be commended for a job well done, the miracle of bringing our wonderful Florida Sunshine into your home through every can of frozen orange concentrate we produce.

EXTRACTING CITRUS JUICES

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In the production of citrus juice products the quality of the starting material is first in order of importance in determining the quality of the finished product. The quality of the end product can be, of course, no better than the quality of the fruit used. However, there are numerous operational steps involved in the production of citrus juices, single strength or frozen concentrates, with each having varying degrees of influence on the ultimate quality of the finished product. One of the most important, if not the most important, of the steps, is the extraction of the juice from the fruit. The newest method of extraction is the subject of the present discussion.

The FMC In-Line Extractor was so named because the series of extraction cups are situated in a straight line. This machine is built in two sizes. The five cup (or five head as it is usually called) has the capacity of extracting 200 fruit per minute. This unit is used for oranges, tangerines, lemons, limes, and small grapefruit. The three cup machine is used for the larger sizes of grapefruit and has a capacity of 120 fruit per minute. This unit is equipped with cups of 6 inch diameter whereas, the five-head unit is equipped with cups either 3 or 4 inch as required.

The upper cups are mounted on a common cross-bar which by means of a cam-drive is moved in a fixed up and down path. The corresponding lower cups are held in rigid position. All of these cups are so constructed as to consist of a plurality of fingers such that the individual upper and lower cups inter-mesh. A circular cutter tube is fastened in the bottom of each of the lower cup members, and this protrudes below into a strainer tube having 3/32 inch perforations. Mounted below the lower cups and enclosing the strainer tubes is a manifold which is common to all of the lower cups and strainer tubes of a single machine. An unperforated hollow tube (or orifice tube) closely fitted inside the strainer tube is caused to slide up and down inside the latter. The orifice tubes are fastened to a cross-bar which is moved in a fixed up and down path by the same cam-drive which moves the upper cups.