PBTC 02-3

International Agricultural Trade and Policy Center

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By

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PBTC 02-3 May 2002

POLICY BRIEF SERIES

UNIVERSITY OF FLORIDA

Institute of Food and Agricultural Sciences

INTERNATIONAL AGRICULTURAL TRADE AND POLICY CENTER

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THE IMPACT OF ELIMINATION OF THE U.S. ORANGE JUICE TARIFF ON THE MARKET FOR PROCESSED ORANGE PRODUCTS

Thomas H. Spreen, Charlene Brewster, and Mark A. Brown[1]

The Free Trade Area of the Americas (FTAA) is a proposal that would create a free trade zone encompassing nearly all of the countries of the Western Hemisphere. This region encompasses a population of 825 million with an aggregate GDP of US$10 trillion[2]. It would be the largest free trade zone in the world. The countries included in the FTAA account for most of the world's production of orange juice. The states of Sao Paulo, Brazil and Florida in the United States together produce approximately 85 percent of the world's orange juice. Mexico and Cuba in the Western Hemisphere and Italy, Spain, and Greece in Europe also produce orange juice for export. World production of orange juice by country is shown in Table 1.

The United States is the largest processed orange consuming country in the world. Canada is also a large market despite its relatively small population; Canada's per capita consumption rivals that found in the United States[3]. The other countries of the Western Hemisphere, however, do not have significant consumption of orange juice. Consumers in these countries still buy oranges in fresh form and produce orange juice at home.

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[2] As reported by WEFA, the GDP of the NAFTA countries in 1999 was US$8.7 trillion in 1990 US$, and the GDP of the other Western Hemisphere countries in 1999 was US$1.4 trillion in 1990 US$.

[3] Canada imports frozen concentrated orange juice at no tariff. All of its imports from NAFTA partners are tariff free; it does, however, levy a two per cent ad valorem on single strength orange juice imports from non-NAFTA countries such as Brazil.

Thus, nearly all of Brazil's orange juice production is exported. Outside of the Western Hemisphere, the European Union is the other major orange juice-consuming region. Consumption of orange juice in the major consuming regions of the world is shown in Table 2.

The purpose of this paper is to project the possible impact of the FTAA on world orange juice trade. The analysis is conducted using a mathematical model of the world orange juice market developed at the University of Florida (McClain; Brewster and Spreen). This paper is condensation of another paper recently completed by Spreen, et al.

The Impact of Not-From-Concentrate Orange Juice

The introduction of not-from-concentrate orange juice, also known as NFC, into the orange juice markets of the United States and Canada has been one of the most important phenomena of the 1990's. Consumption of NFC in the United States has increased from less than 200 million SSE gallons in 1988-89 to over 500 million single strength equivalent (SSE) gallons in the 2000-01 season (Table 3). Much of this growth has occurred despite the fact the retail prices of NFC have remained relatively stable over that period. The widespread acceptance of NFC by North American consumers has been unexpected and requires a change in the understanding of the world orange juice market.

The growth of NFC consumption in the United States and Canada affects world trade in orange juice in that nearly all of the NFC consumed in North America is produced in Florida. Mexico has exported small quantities of NFC to the United States (less than four million SSE gallons), but to date, very little NFC has been shipped from Brazil to the United States. As such, an increasing share of Florida's orange crop has

been allocated to NFC. In the last three seasons, over 40 percent of Florida's orange crop has been sent to the NFC market (Florida Citrus Processors Association).

Nearly all of the frozen concentrated orange juice (FCOJ) traded in the world is first concentrated to 65º or 66º Brix. At this level of concentration, six parts water must be added to reconstitute the juice to single strength equivalent. NFC, on the other hand, is never concentrated. Thus to ship an equivalent volume of NFC compared to FCOJ, six times the volume must be shipped. As a result, transportation costs become an increasingly important component of the cost of NFC delivered to its final destination.

An important implication of the establishment of a large scale NFC market in the United States is that, for the present, the Florida processed orange industry has been able to differentiate its product from that produced elsewhere and thereby partially insulate itself from import competition. In the analysis of the proposed FTAA, the markets for NFC and reconstituted FCOJ in the United States must be separated as the latter market is more vulnerable to reduction or elimination of the U.S. orange juice tariff.

Consumption of NFC has begun in both Canada and the European Union. Given Canada's proximity to the United States, it is not surprising that Canadian consumers have begun drinking NFC. Canadian import data can be used to infer the composition of consumption. While data is available on imports of orange juice into the EU, the composition of imports is not known. U.S. export data indicate that approximately 70 million SSE gallons of NFC were exported from the United States in both the 1998-99 and 1999-00 seasons. Of this total, over 90 percent of U.S. exports were sent to Canada and the EU[4].

[4] Data was recently published in a USDA publication regarding imports of NFC into Europe. That report, however, contained no information on domestic production of NFC in the EU. Both Spain and Italy have

Tariffs and the World Orange Juice Market

Three of the largest orange consuming regions levy tariffs on imported orange juice. In this section, those tariffs are reviewed. Recently, these tariffs have been reduced as negotiated in the Uruguay Round of GATT. The most favored nation (MFN) FCOJ tariff schedules for the United States, the European Union, and Japan are shown in Table 4. Prior to the GATT agreement of 1994, Canada imposed an ad valorem tariff of three percent on imports of FCOJ. Import tariffs imposed on orange juice from the United States and Mexico have been phased out under the North American Free Trade Agreement (NAFTA).

The United States allows the importation of orange juice duty-free to those countries identified under the Caribbean Basin Economic Recovery Agreement (CBERA) also known as the Caribbean Basin Initiative (CBI). CBERA countries that currently export orange juice to the United States include Costa Rica, Belize, Honduras, and the Dominican Republic. In 2000, imports from CBERA countries totaled 65.7 million SSE gallons, which was 20.6 percent of total U.S. imports and approximately four percent of total U.S. orange juice consumption.

Under NAFTA, both the United States and Mexico agreed to phase out their tariffs on orange juice imports over a 15-year period, beginning in 1994. At the time the agreement was signed, Mexico levied a 20 percent ad valorem duty on imports of orange juice, even though very little was imported. Before NAFTA, Mexico's exports to the United States were subject to the MFN tariff, which at the time the agreement was implemented was US$.35 per SSE gallon for FCOJ and $.175 per SSE gallon for NFC.

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become significant producers of NFC, but their exact production figures are not known. For further discussion, see Goodrich and Brown.

Imports of orange juice from Mexico had been increasing before NAFTA was implemented which raised fears in Florida that reductions in the U.S. orange juice tariff would result in massive increases in Mexican juice exports. To allay these fears, a rather complicated arrangement was negotiated under which Mexican exporters were granted a tariff rate quota of 40 million SSE gallons at one-half the prevailing MFN tariff or US$.175 per SSE gallon. Exports above 40 million SSE gallons are charged a higher tariff that declines over a 15-year period, reaching zero in 2008. A snapback provision was built into the agreement that was intended to protect against "surges" of orange juice imports from Mexico. In the snapback provision, if both price and quantity triggers were crossed, then over quota imports would be charged the MFN tariff rate.

Analytical Model

A model of the world orange juice market has been developed at the University of Florida. This model was originally developed in 1989 (McClain) and has been updated and modified since then (Brewster and Spreen). In the model, there are four production areas for orange juice: Sao Paulo, Florida, Mexico, and California, United States. Production in Sao Paulo and Florida is modeled explicitly, while production from Mexico and California is assumed to be fixed over the forecast horizon. The existing tree inventory in Sao Paulo and Florida is used to forecast orange production in each region. Historical processed utilization rates and juice yields are combined with the orange production forecast to predict orange juice production in each region. After a spatial price equilibrium is established, lagged grower (on-tree) prices are used to predict future tree plantings. Historical tree loss rates are used to adjust the tree inventory. The

updated inventory is then used to predict next year's crop. The model is solved in a forward recursive fashion over a specified time horizon.

The four consumption regions included in the model are the United States, Canada, the EU, and Japan. The tariffs imposed by these countries are included in the pricing structure of the model. Demand equations have been estimated for each of these countries, which also account for growth in demand over time. For the purposes of this analysis, the annual demand growth rates are assumed to be 1 percent in the United States, .5 percent in Canada, 2 percent in the EU and 2.5 percent for Japan[5].

The model allocates the available supply of orange juice across the four consumption regions so as to establish a spatial price equilibrium. It is assumed that in each year, production equals consumption, i.e. changes in inventory are not taken into account. In the most recent version of the model, the orange juice markets in the both the United States and Canada are disaggregated into consumption of NFC and FCOJ. Since most of the FCOJ produced is ultimately consumed as reconstituted chilled orange juice, this level of disaggregation was deemed appropriate. Separate demand equations have been estimated for NFC and FCOJ at the processor level, i.e. the prices in the model reflect the prices charged by processors for NFC and bulk FCOJ. Each demand equation also includes a cross price effect. This term accounts for the fact that NFC and bulk FCOJ are close substitutes. The quantity of FCOJ in the market affects the price of NFC and vice versa.

[5] A demand growth rate of 1 percent means that a 1 percent increase in the quantity consumed can be accomplished with no increase in price. Demand growth in the United States and Canada is mainly driven by population growth. Demand growth in Europe and Asia is primarily the result of increased per capita consumption. These estimates are based upon work by the Florida Department of Citrus.

For a discussion of the mathematical model used to conduct the empirical analysis as well as specification and validation of the baseline model, see Spreen, et al.

Empirical Results-Baseline Model

Projected orange and orange juice production in Sao Paulo and Florida are shown in Table 6. Orange production in Sao Paulo is projected to decline from the 395 million 90 pound box crop produced in 1999-00 to 332.7 million boxes in the 2004-5 season. Production is projected to recover to nearly 360 million boxes by the 2009-10 season and continue to expand to 484 million boxes by 2020. The near term decline in Sao Paulo orange production is a result of CVC, a viral disease which has killed millions of young trees in Sao Paulo over the past five years. The latest data on tree numbers in Sao Paulo indicate that there are currently 12 million nonbearing orange trees in the state. The normal annual death loss in Sao Paulo is about six percent. In the 1999-00 season, there were an estimated 162 million bearing trees in Sao Paulo (FAS, USDA) so that nearly 10 million trees were needed to enter the bearing tree population each year. With a total of 12 million nonbearing trees (ages less than one year, 1-2 years, and 2-3 years), bearing tree numbers began to decline in that season and should continue to decline over the next few seasons.

Orange production in Florida is estimated to increase modestly to 255 million 90-pound boxes (the current level is 232 million boxes) by the 2004-5 season. Orange production is projected to grow slowly over the next 15 years reaching 278 million boxes by the 2019-20 season (Table 9). This forecast is based upon the reality that Florida orange producers face constraints to significantly expand citrus production. These constraints include competition from urban growth for land and water, and the problem of

finding harvest labor. Research is underway in Florida on mechanical harvesting of citrus, but it is not yet widely adopted.

Orange juice production in Sao Paulo is projected to decline to 1.48 billion pound solids (1.05 million MT @ 65º Brix) in the 2004-5 season. Production will then recover to 1.60 billion pound solids in 2009-10 and continue to grow to 2.15 billion pound solids by 2020. Orange juice production in Florida is projected to range from 1.5 billion to 1.7 billion pound solids over the next 20 years (Table 6).

Even though total orange production in Sao Paulo is considerably larger compared to Florida, in recent years, Florida's production of orange juice rivals that in Sao Paulo. This occurs because processed utilization is much higher in Florida (94 percent versus 74 percent) and juice yields are higher in Florida, although Sao Paulo has been closing the gap in recent years.

With this production forecast, consumption levels in the four major consuming regions are expected to expand modestly over the next 20 years as shown in Table 7. With per capita consumption in the EU continuing to expand, EU consumption is expected to exceed 1.21 million MT @ 65º Brix by 2020. With underlying demand growth in all four markets, increased production can be accommodated with stable prices (Tables 8 and 9). Processor prices in Florida for FCOJ are projected to be nearly flat averaging approximately US$1575 per MT @ 65º Brix for FCOJ. NFC prices are also expected to show a similar pattern over the forecast period. Prices in the other consumption markets are expected to decline modestly.

Prices at these levels mean that grower prices should remain in a profitable range over the forecast period. Grower prices in Sao Paulo should range from US$1.88 to

$US2.20 per box, while prices in Florida will range from US$4.39 to US$4.82 per box. These on-tree prices are above the cost of production in both Sao Paulo and Florida as recently reported by Muraro, et al. and could be sufficiently high to encourage expansion of the world's citrus industry in countries other than the United States and Brazil.

On-tree prices that exceed cost of production in Sao Paulo have proven, in the past, to stimulate new tree plantings. The main competitor to orange production for land and labor in Sao Paulo is sugarcane. Brazil has recently modified its ethanol program so as to divert more cane to sugar production. Combined with a worldwide oversupply of sugar and other sweeteners, this decision has resulted in depressed cane prices in Brazil for the past two years. The recent increase in the world price of oil has caused the government of Brazil to reconsider its recent policy changes towards ethanol. This change will likely stimulate the domestic sugarcane industry and provide a viable alternative to citrus in Sao Paulo.

The Projected Impact of FTAA on the World Orange Juice Market

The Free Trade Area of the Americas (FTAA) proposal is intended to create a free trade zone extending from Canada to Chile and Argentina. If it is similar in scope to other free trade agreements, it is likely that tariffs and quotas will be eliminated on nearly all products traded within the region. Clearly, the U.S. tariff on orange juice imports is one of those import tariffs that could be affected by the passage of FTAA.

In this analysis, the impact of elimination of the U.S. tariff on orange juice imports is conducted using two scenarios. Scenario 1 assumes that the tariff on both FCOJ and NFC will be phased out over a 15-year period beginning in 2002. A 15-year phase out is considered because this is the same timetable used in the North American

Free Trade Agreement. Scenario 2 is based upon the assumption that the tariff would be reduced to zero beginning with the 2002-3 season. The results of this analysis are summarized in Tables 8-17.

The impact of phased and immediate elimination of the U.S. orange juice tariff on Sao Paulo is shown in Table 8. The results indicate that tariff elimination would have little effect on orange production in Sao Paulo. At the end of the forecast horizon, orange production in Sao Paulo is projected to be 494 million boxes under immediate elimination, a level 10 million boxes greater than that forecast if the tariff remains in place. Phased elimination of the tariff is projected to gradually increase on-tree prices in Sao Paulo with the advantage reaching US$.12 per box by 2015-16. Immediate tariff elimination results in an immediate gain of US$.32 per box in 2002-03 expanding to US$.55 per box in 2019-20.

The impact of tariff elimination on Florida orange producers is shown in Table 9. As is the case with Sao Paulo, the impact of the tariff removal on Florida orange production is not large over the 19 year forecast horizon. At the end of the forecast horizon, Florida orange production under phased elimination is projected to be 272 million boxes compared to 278 million boxes in the baseline. Under immediate elimination, the impact is greater with projected production being 251 million boxes in 2019-20, a decline of nearly 10 percent. The impact on on-tree prices, however, is greater. Phased elimination of the tariff is projected to reduce on-tree prices in Florida by US$.30 per box in 2014-15, a decline of 6 percent. Immediate elimination would cause grower prices in Florida to decline by more than US$ 1.14 per box early in the forecast period. By the end of the forecast period, grower prices are projected at US$ 3.91 per

box, still well below the $4.51 per box forecasted under phased elimination. Thus, if the tariff is removed, Florida growers would fare much better under a phased reduction compared to immediate elimination.

One way to measure the impact of immediate elimination of the tariff on Florida orange producers is to examine its impact on producer revenue. If the tariff were eliminated immediately, producer revenue in Florida would decline by US$291 million in the 2004-5 season, and US$343 million in the both 2009-10 and 2019-20 seasons. These declines represent a 25 percent decline in 2004-05 and 26 percent in 2019-20. Another impact is illustrated in that future orange production is expected to rise modestly with the tariff intact, but follows a more cyclical pattern under immediate elimination with projected production in 2019-20 nearly equal to that projected for 2002-03.

The impact of tariff removal on orange juice consumption and prices in the United States is shown in Table 10. Under immediate tariff elimination, U.S. orange juice consumption is projected to increase by 84,000 MT @ 65º Brix in 2002-03 (equivalent to about 117 million SSE gallons). Almost all of the consumption increase would be FCOJ. By 2015-16, the projected increase in U.S. consumption is 100,000 MT, or eight percent. To support higher consumption, FCOJ processor prices in the United States would decline by approximately US$299 per MT @ 65º Brix (equivalent to approximately US$.21 per pound solid) in the 2002-03 season or 20 percent. NFC prices in the United States would also decline, although the percentage decline is smaller than that projected for FCOJ. NFC prices changes are due to the cross price effect between NFC and FCOJ and that the model chooses to increase NFC production in Florida.

The impact of phased reduction and immediate elimination of the U.S. orange juice tariff on orange juice prices and consumption in Canada is not shown. Immediate elimination would cause virtually no change in Canadian orange juice consumption and a small increase in price. Phased reduction would also result in virtually no change in orange juice consumption over the forecast horizon.

Elimination of the U.S. orange juice tariff on Brazilian imports would cause prices in the EU to increase and consumption to decrease. This result occurs because the U.S. market has become more attractive to Brazilian exporters vis-à-vis the EU market. The impact of phased reduction and immediate elimination of the U.S. tariff on orange juice prices and consumption in the EU is shown in Table 11. Under immediate U.S. tariff elimination, the impact in the EU would be modest, as EU consumption is projected to decline approximately 76,000 MT @ 65º Brix in 2002-03, a decline of nearly 9 percent. By the 2019-20 season, projected consumption in the EU is expected to decrease by nearly 173,000 MT. Prices are projected to increase by US$92 per MT @ 65º Brix in 2002-03 and by US$161 per MT in 2019-20, the latter figure representing a price increase of 12 percent. Phased elimination of the U.S tariff has a smaller impact on EU orange juice consumption and prices, although consumption declines by 42,000 MT and prices are projected to increase by US$ 39 per MT in 2019-20. Although not shown here, the impact of U.S. tariff elimination on Japan is similar to the EU. Japanese consumption declines modestly with a commiserate increase in price.

The impact of U.S. tariff reductions on world trade in orange juice is shown in Tables 12-17. In Table 12, projected exports under the present tariff regime by country of destination from Sao Paulo are shown. While the figures shown here underestimate

recent levels of exports to the United States, they do confirm that the EU has become the most important market for Brazilian orange juice[6]. In Table 13, projected exports from Sao Paulo under phased elimination of the U.S. tariff are shown, while Table 14 presents results for Sao Paulo if the tariff were eliminated immediately in the 2001-02 season.

The clear conclusion drawn from the figures presented in Tables 12-14 is that U.S. imports of FCOJ from Brazil will increase substantially if the U.S. orange juice tariff is eliminated. Under immediate elimination, U.S. imports would increase by 89,000 MT @ 65º Brix in the 2002-03 season. Under phased elimination, there is a gradual increase in U.S. FCOJ imports, which reach 142,000 MT in the 2019-20 season compared to 86,000 MT in the baseline model

Increased imports by the United States would come at the expense of exports to the EU and Japan. Canada would be only marginally affected. Since both the EU and Japan are assumed to maintain their FCOJ tariff in the scenario presented here, it is not surprising that consumption in these two regions would be adversely affected by phased reduction or immediate elimination of the U.S. tariff.

The figures presented in Table 14 also help explain why the supply response in Sao Paulo is relatively small if the U.S. orange juice tariff is removed. Under immediate tariff elimination, the United States is projected to account for less than 10 percent of Sao Paulo's market. Therefore the price impact on Brazilian growers and processors is diluted by the fact that the majority of its exports will still be sent to other markets.

Another factor that limits supply response in Sao Paulo is that the industry is already undergoing a major recovery from the trees lost to CVC. There are physical

[6] For example, U.S. imports of Brazilian orange juice were nearly 200 million SSE gallons in 2000-01 season and the model indicates that approximately 74 million SSE gallons will be exported in 2001-02. It is difficult to completely validate of model of this type and trade flows are particularly difficult to track.

limits on how quickly orange groves can be developed. The main lesson learned in Sao Paulo from its last major expansion is that use of non-certified planting material can lead to serious disease problems.

Utilization of orange juice production in the United States under the three scenarios is shown in Tables 15-17[7]. Under the current tariff regime, United States consumption of NFC is expected to grow modestly from current levels reaching nearly 652 million SSE gallons by the 2019-20 season[8]. U.S. consumption of FCOJ (including reconstituted chilled orange juice and retail pack FCOJ) is expected to grow modestly, with Florida production of FCOJ reaching 751,000 MT @ 65º Brix by 2019-20. The model suggests that all of the FCOJ supplied to Canada will come from Brazil. Currently, a large proportion of FCOJ consumption in Canada originates from Florida[9].

Under phased tariff elimination (Table 16), allocation of orange production to FCOJ by U.S. producers remains relatively flat, while NFC production increases compared to the with tariff scenario. The result is consistent with the notion that Florida has a comparative advantage in the supply of NFC to the North American market and thus with declining tariff protection, it would choose to allocate an ever increasing share of its production to NFC.

In Table 17, utilization of U.S. orange juice under immediate tariff elimination is shown. The trend discerned from these figures is similar to that observed in Table 16 except that the impact occurs much sooner. Utilization of U.S. orange production in the

[7] The figures presented in Tables 15-17 include orange juice production from California, Arizona, and Texas.
[8] Some would argue that this forecast is conservative. In the model, growth of NFC consumption is expected to moderate from the high levels that occurred over the past decade.
[9] Given the duty drawback option available to Florida processors, it is possible that the model accurately reflects the present situation in Canada even though the model does not choose to "pass through" Brazilian concentrate which is ultimately destined for Canada.

U.S. FCOJ market decreases and increased utilization occurs in NFC produced for both the U.S. and Canadian market for all years of the forecast horizon.

Although not explicitly included in the quantitative model of the world orange juice market, phased reduction or complete elimination of the U.S. orange juice tariff would have adverse effects on those countries which currently enjoy preferential access to the U.S. orange juice market. These countries include Belize, Costa Rica, Honduras, and Mexico. Given that all of these countries currently export most of their orange juice production to the United States, reduced tariffs for Brazilian exporters would result in lower prices received for exports from third countries along with a possible loss of market share. These countries might choose to send more of their production to the EU. Given Mexico's proximity to the United States, orange juice processors in that country could possibly insulate itself from competition from Brazil by focusing on NFC production.

Concluding Remarks

World orange juice consumption and trade has shown remarkable growth over the past two decades. After major freezes destroyed many orange trees in Florida in the 1980's, the high prices that followed have spurred a major expansion in orange production in both Florida and Sao Paulo, Brazil. These two regions continue to dominate the world market for orange juice, collectively accounting for approximately 85 percent of world production.

Using a mathematical model of the world orange juice market, production and price projections are made through the 2019-20. These projections indicate that in the near term, world orange juice production will decline somewhat as Brazil recovers from

the effects of CVC, a viral disease that has killed millions of young trees. Production should recover by 2010, and continue to expand to 2020 with Brazilian orange juice output projected to reach 1.6 million MT @ 65º Brix. Orange juice production in Florida is expected to remain relatively flat at 1.1 million MT @ 65º Brix. It is anticipated that other citrus producing regions will not significantly expand their production of orange juice over the next 20 years. The possible exception to this observation is Mexico, which will gain tariff free access to the United States in 2008.

The main impact of FTAA would be duty free access for Brazil to the United States. In recent years, Brazil's orange juice exports to the United States have stabilized at approximately 175,000 MT @ 65º Brix. As nearly all of Brazil's exports are FCOJ, the potential impact of elimination of the U.S. tariff has been muted somewhat with the increase in NFC consumption in the United States.

The quantitative effects of complete elimination of the U.S. orange juice tariff on Brazilian imports suggest that the benefit to Brazilian orange producers would not be large. Production would increase slightly, and on-tree prices would also increase. The impact on Florida producers is somewhat larger. Production in Florida would contract, and on-tree prices are expected to decline substantially. Expanded consumption in the United States would come at the expense of reduced consumption in the EU, Canada, and Japan. Smaller orange juice producing countries such as Mexico, Belize, and Costa Rica would also be adversely affected as these countries currently enjoy preferential access to the U.S. market.

If negotiations begin in earnest on FTAA, the U.S. orange juice tariff will be one of the most debated topics. It is hoped that the results presented herein are helpful to those discussions.

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Table 1. Processed Orange Production by Country, 1998[a]

Country	Production (1000 MT)
Brazil	13,464
United States	10,213
Italy	940
Mexico	700
Spain	664
Cuba	345
Greece	310
South Africa	228
Argentina	196
Australia	192
Israel	142
Others	495
Total	27,889

Source: FAO

[a]Figures presented are in fresh fruit equivalent

Table 2. Processed Orange Consumption by Country, 1998[a]

Country	Consumption (1000 MT)	Per Capita (kg)
United States	11,773	42.96
European Union	13,745	36.70
Canada	1,241	40.60
Australia	276	14.91
Mexico	273	2.85
Brazil	243	1.47
Japan	208	1.65
Others	1,302	N/A
Total	29,061	4.92

Source: FAO

[a] Figures presented are fresh fruit equivalent

Table 3. U.S. Consumption of Orange Juice by Category, 1988-89 through 2000-01

Season	FCOJ[a]	NFC[b]	Total[c]
	----------million SSE gallons--------		
1988-89	1078	190	1268
1989-90	890	213	1103
1990-91	871	229	1100
1991-92	893	233	1126
1992-93	1006	280	1286
1993-94	1080	301	1381
1994-95	1065	317	1382
1995-96	1028	347	1374
1996-97	1064	371	1435
1997-98	1142	455	1597
1998-99	1077	472	1548
1999-00	1119	481	1600
2000-01[d]	966	535	1501

[a]Estimated as a residual. Includes FCOJ, reconstituted OJ, and shelf stable OJ.

[b]Estimated as Florida NFC production + estimated other U.S. NFC production + NFC imports - NFC exports + Florida NFC inventory adjustment.

[c]Based upon estimates from the Florida Department of Citrus

[d]Forecasted values.

Table 4. FCOJ Tariff Schedule for Major Orange Juice Importing Countries under GATT

Year	U.S.	Europe	Japan
	cents/SSE gal	--------ad valorem---------	
1994	35.01	19	30
1995	34.13	18.37	29.25
1996	33.24	17.74	28.50
1997	32.36	17.10	27.75
1998	31.48	16.47	27.00
1999	30.59	15.84	26.25
2000 and beyond	29.71	15.20	25.50

Source: Spreen and Mondragon

Table 6. Projected Production of Oranges and Orange Juice in Sao Paulo and Florida, 2005, 2010, and 2020

	Projected Orange Production		Projected Orange Juice Production	
	Sao Paulo	Florida	Sao Paulo	Florida
Season	Million Boxes		Million Pound Solids	
2004-05	332.7	254.7	1477	1581
2009-10	359.8	264.7	1597	1645
2019-20	484.3	278.3	2150	1733

Table 7. Projected Orange Juice Consumption in Major Consuming Regions in 2005, 2010, and 2020

	Consumption Region			
	United States[a]	Canada	European Union[b]	Japan
Season	1000 MT @ 65° Brix			
2004-5	1160	94	872	92
2009-10	1213	96	936	101
2019-20	1341	103	1213	136

[a] Includes both NFC and FCOJ consumption.

[b] Does not include production from other areas

Table 8. Projected Orange Production and On-Tree Prices in Sao Paulo With, Phased Reduction of, and Immediate Elimination of the U.S. Orange Juice Tariff

	With U.S. Tariff		Phased Reduction		Immediate Elimination	
Season	Production (Mil. Boxes)	On-Tree Price (US$/box)	Production (Mil. Boxes)	On-Tree Price (US $/box)	Production (Mil. Boxes)	On-Tree Price (US $/box)
2001-02	330.0	2.07	330.0	2.07	330.0	2.07
2002-03	337.4	1.88	337.4	1.91	337.4	2.20
2003-04	333.9	1.99	333.9	2.03	333.9	2.31
2004-05	332.7	2.07	332.7	2.14	332.7	2.39
2005-06	333.6	2.14	333.6	2.23	333.7	2.46
2006-07	337.2	2.18	337.6	2.27	337.8	2.49
2007-08	342.6	2.20	342.7	2.27	343.3	2.52
2008-09	349.9	2.20	350.0	2.27	351.1	2.53
2009-10	359.8	2.17	360.1	2.24	361.6	2.52
2010-11	372.1	2.11	372.6	2.21	374.6	2.50
2011-12	386.9	2.06	387.5	2.16	390.1	2.46
2012-13	402.0	2.00	402.8	2.10	405.9	2.42
2013-14	415.8	1.96	416.8	2.07	420.5	2.40
2014-15	429.6	1.92	430.8	2.03	435.1	2.39
2015-16	442.5	1.90	443.9	2.01	448.8	2.38
2016-17	455.0	1.88	456.7	2.00	462.2	2.39
2017-18	466.6	1.87	468.5	2.00	474.6	2.40
2018-19	476.1	1.89	478.3	2.02	485.0	2.43
2019-20	484.3	1.92	486.7	2.06	494.0	2.48

Table 9. Projected Orange Production and On-Tree Price in Florida With, Phased Reduction of, and Immediate Elimination of U.S. Orange Juice Tariff

	With U.S. Tariff		Phased Reduction		Immediate Elimination	
Season	Production (mil. Boxes)	On-Tree Price (US $/box)	Production (mil. Boxes)	On-Tree Price (US $/box)	Production (mil. Boxes)	On-Tree Price (US $/box)
2001-02	232.7	4.76	232.7	4.76	232.7	4.76
2002-03	251.2	4.39	251.2	4.35	251.2	3.25
2003-04	253.2	4.52	253.2	4.38	253.2	3.37
2004-05	254.7	4.62	254.7	4.39	254.7	3.47
2005-06	256.0	4.71	256.0	4.39	256.0	3.56
2006-07	257.7	4.76	257.7	4.44	257.7	3.61
2007-08	259.9	4.80	259.8	4.54	259.1	3.66
2008-09	262.1	4.82	262.0	4.59	260.2	3.69
2009-10	264.6	4.80	264.2	4.54	261.0	3.69
2010-11	266.4	4.87	265.6	4.54	260.8	3.69
2011-12	268.1	4.82	266.9	4.50	260.3	3.67

2012-13	269.8	4.77	268.0	4.45	259.6	3.66
2013-14	271.4	4.73	269.1	4.43	258.6	3.66
2014-15	272.8	4.71	269.9	4.41	257.5	3.67
2015-16	274.1	4.69	270.5	4.40	256.3	3.70
2016-17	275.2	4.68	271.0	4.40	255.0	3.73
2017-18	276.3	4.69	271.4	4.42	253.6	3.77
2018-19	277.3	4.72	271.8	4.46	252.4	3.83
2019-20	278.3	4.76	272.1	4.51	251.2	3.91

Table 10. Orange Juice Consumption and Price in the United States with, Phased Reduction of, and Immediate Elimination of the U.S. Orange Juice Tariff

	Consumption			Prices					
	With Tariff	Phased Reduction	Immediate Elimination	With Tariff		Phased Reduction		Immediate Elimination	
Season	--------- 1000 MT @ 65° Brix			NFC[a]	FCOJ[b]	NFC[a]	FCOJ[b]	NFC[a]	FCOJ[b]
2001-02	1115	1115	1115	1.60	1570	1.60	1570	1.60	1570
2002-03	1147	1153	1231	1.55	1497	1.53	1476	1.34	1198
2003-04	1154	1166	1239	1.57	1523	1.54	1480	1.35	1224
2004-05	1160	1178	1247	1.58	1545	1.54	1480	1.37	1245
2005-06	1167	1192	1256	1.59	1562	1.53	1476	1.38	1262
2006-07	1177	1202	1268	1.60	1572	1.54	1484	1.39	1271
2007-08	1188	1209	1280	1.61	1578	1.55	1507	1.39	1278
2008-09	1200	1220	1293	1.61	1578	1.56	1519	1.39	1281

2009-10	1213	1233	1306	1.60	1570	1.56	1512	1.39	1277
2010-11	1221	1247	1320	1.59	1589	1.55	1503	1.38	1272
2011-12	1236	1262	1336	1.58	1575	1.54	1489	1.38	1262
2012-13	1252	1278	1351	1.58	1560	1.53	1476	1.37	1254
2013-14	1266	1292	1366	1.57	1549	1.52	1466	1.37	1248
2014-15	1280	1307	1380	1.57	1540	1.52	1459	1.37	1244
2015-16	1294	1321	1394	1.57	1535	1.51	1453	1.37	1244
2016-17	1307	1334	1407	1.57	1530	1.51	1450	1.37	1244
2017-18	1320	1346	1420	1.57	1529	1.51	1450	1.37	1247
2018-19	1331	1358	1431	1.57	1533	1.52	1456	1.38	1255
2019-20	1341	1368	1442	1.58	1540	1.52	1464	1.38	1267

[a] US $ per SSE gallon, processor price.
[b] US $ per MT @ 65º Brix, processor price.

Table 11. Orange Juice Consumption and Prices in the European Union With, Phased Reduction of, and Immediate Elimination of the U.S. Orange Juice Tariff

	Consumption			Prices		
Season	With Tariff	Phased Reduction	Immediate Elimination	With Tariff	Phased Reduction	Immediate Elimination
	--------- 1000 MT @ 65° Brix ----------			----------U.S. $ per MT @ 65º Brix ----------		
2001-02	821	821	821	1358	1358	1358
2002-03	883	877	806	1304	1311	1396
2003-04	875	864	796	1334	1348	1427
2004-05	872	855	791	1358	1378	1452
2005-06	873	850	791	1378	1406	1470
2006-07	881	858	798	1390	1416	1480
2007-08	893	873	807	1396	1417	1489
2008-09	911	892	821	1397	1416	1492
2009-10	936	917	841	1388	1409	1487
2010-11	970	944	863	1370	1399	1482
2011-12	1003	976	889	1354	1383	1470
2012-13	1037	1008	916	1337	1367	1460
2013-14	1068	1037	939	1325	1357	1454
2014-15	1098	1066	961	1314	1347	1450
2015-16	1126	1092	982	1307	1341	1449
2016-17	1153	1116	1001	1303	1338	1449
2017-18	1177	1139	1018	1301	1338	1453
2018-19	1197	1156	1030	1305	1344	1463
2019-20	1213	1171	1040	1315	1354	1476

Table 12. Projected exports of FCOJ from Sao Paulo, Brazil by destination under existing tariff schedule, 2001- 02 through 2019 – 2020.

Season	Destination			
	United States	Canada	European Union	Japan
	1000 MT @ 65^{o} Brix			
2001-2	53	63	821	85
2002-3	7	64	883	91
2003-4	4	64	875	91
2004-5	4	64	872	92
2005-6	6	63	873	93
2006-7	8	63	881	94
2007-8	9	63	893	96
2008-9	12	63	911	98
2009-10	14	63	936	101
2010-11	14	64	970	105
2011-12	23	64	1003	109
2012-13	31	64	1037	113
2013-14	39	65	1068	117
2014-15	47	65	1098	120
2015-16	56	65	1126	124
2016-17	64	65	1153	127
2017-18	73	65	1177	131

2018-19	80	65	1197	134
2019-20	86	65	1213	136

Table 13. Projected exports of FCOJ from Sao Paulo under phased elimination of the U.S. tariff, by destination, 2001-02 through 2019-20.

Season	Destination			
	United States	Canada	European Union	Japan
	1000 MT @ 65^{o} Brix			
2001-2	53	63	821	85
2002-3	14	64	877	91
2003-4	18	64	864	90
2004-5	23	64	855	90
2005-6	32	63	850	90
2006-7	34	63	858	92
2007-8	32	63	873	94
2008-9	34	63	892	97
2009-10	37	63	917	100
2010-11	46	64	944	103
2011-12	56	64	976	107
2012-13	67	64	1008	110
2013-14	77	65	1037	114
2014-15	88	65	1066	117
2015-16	100	65	1092	121
2016-17	111	65	1116	124
2017-18	123	65	1139	127
2018-19	133	65	1156	130
2019-20	142	65	1171	132

Table 14. Projected exports of FCOJ from Sao Paulo under immediate elimination of the U.S. tariff by destination, 2001-02 through 2019-20.

	Destination			
Season	**United States**	**Canada**	**European Union**	**Japan**
	1000 MT @ 65^{o} Brix			
2001-2	53	63	821	85
2002-3	96	60	806	84
2003-4	95	59	796	84
2004-5	96	59	791	84
2005-6	100	59	791	85
2006-7	104	58	798	87
2007-8	110	58	807	88
2008-9	119	58	821	90
2009-10	129	58	841	93
2010-11	144	58	863	95
2011-12	163	58	889	99
2012-13	182	59	916	102
2013-14	201	59	939	105
2014-15	220	59	961	108
2015-16	240	59	982	111
2016-17	260	59	1001	113
2017-18	279	58	1018	116
2018-19	297	58	1030	118
2019-20	313	58	1040	120

Table 15. Projected utilization of U.S. orange juice production, under existing U.S. tariff by product form and destination, 2001-02 through 2019-20.

Season	United States FCOJ	United States NFC	Canada NFC
	1000 MT @ 65° Brix	Million SSE gallons	
2001-2	668	499	41
2002-3	741	529	19
2003-4	744	533	23
2004-5	747	536	26
2005-6	748	540	29
2006-7	749	547	33
2007-8	750	554	36
2008-9	751	564	40
2009-10	754	572	44
2010-11	757	575	46
2011-12	757	586	47
2012-13	756	596	48
2013-14	756	606	48
2014-15	755	616	49
2015-16	754	624	50
2016-17	752	633	51
2017-18	751	641	51
2018-19	750	647	52
2019-20	751	652	53

Table 16. Projected utilization of U.S. orange juice production, under phased elimination of the U.S. tariff by product form and destination, 2001-02 through 2019-20.

Season	United States FCOJ	United States NFC	Canada NFC
	1000 MT @ 65° Brix	Million SSE gallons	
2001-2	668	499	41
2002-3	719	536	42
2003-4	720	547	43
2004-5	720	556	44
2005-6	718	566	45
2006-7	720	573	45
2007-8	726	578	46
2008-9	730	586	47
2009-10	733	594	47
2010-11	732	604	48
2011-12	729	615	49
2012-13	726	626	50
2013-14	723	636	51
2014-15	719	646	51
2015-16	715	655	52
2016-17	710	664	53
2017-18	706	672	54
2018-19	702	678	55
2019-20	699	684	55

Table 17. Projected utilization of U.S. orange juice production, under immediate elimination of the U.S. tariff by product form and destination, 2001-02 through 2019-20.

Season	United States FCOJ	United States NFC	Canada NFC
	1000 MT @ 65° Brix	Million SSE gallons	
2001-2	668	499	41
2002-3	657	616	49
2003-4	661	623	49
2004-5	664	629	50
2005-6	664	635	50
2006-7	665	645	51
2007-8	664	655	52
2008-9	660	666	52
2009-10	656	676	53
2010-11	648	686	54
2011-12	636	697	55
2012-13	624	709	56
2013-14	612	720	57
2014-15	599	730	58
2015-16	586	740	59
2016-17	573	750	60
2017-18	560	759	60
2018-19	548	767	61

2019-20	537	774	62