Today, citrus industry in Argentina is the largest fruit industry of this country and the second largest fresh fruit exporting activity after pear as the number one. 2009 citrus production, on its early estimated, is anticipated to increase to 3.04 million MT, compared to CY 2008, as larger production of all four types of citrus grown in Argentina (lemons, oranges, tangerines/mandarins and grapefruits) is expected due to higher yields resulting from improved management techniques, favorable weather and better phytosanitary conditions. However, after freeze conditions suffered in the Tucuman area, this early estimated will have to be reviewed.
During this presentation we will review actual Argentina context for producing areas, citrus seasonality, distinctive grown varieties and its fruit characteristics. We will see how much is being processed, exported as fresh fruit and consumed on domestic market.

From the historical perspective we will see the weight of lemon byproduct market as the driving force for explosive growth of citrus production and process in Argentina several years ago and how recent events, including new regulations such as agricultural residues are resulting in an adjustment of growth and process rates.

The processing industry in Argentina has evolved to introduce newer technology creating new standard for performance and quality. Industry is more sensitive to environment requirements, and we are seeing the first green certification to the industry under ISO 14000 and carbon reduction footprint.

The present season, shows an important recovery from adverse climate conditions from last year; however in recent weeks we have seen a moderate freeze that will affect the original forecast. Byproduct prices are still struggling to find a fair middle point between supply and demand.

The future looks optimistic with a resurgence on the soft drinks market creating demands and midterm expectations for lemon oil. On the juice side we are seeing a new acidulant application of lemon juice on fruit juices and derivatives with acid deficiencies.
Just below the Tropic of Capricorn in a flat expanse at the foot of the Andes Mountains lies an area, which is the smallest in Argentina, which is blessed with abundant natural rainfall in the summer and a basically dry climate in the winter that enables a bountiful and continual harvest.

Citrus fruits first arrived in Tucumán with the conquistadors in the 1600s. The industry didn’t really get its start, until the Italian and Spanish immigration (from 1910-1930s), and the introduction of their custom of using lemons as a condiment. At this time, the citrus industry took hold in the areas of Tafi Viejo and Yerba Buena, west of the city of Tucumán. The farms were very small: The average farm was 5-10 hectares, and large farms were only 30 hectares. At the end of the 1940s, Tristeza virus attacked all citrus trees that were grafted on rootstocks of sour orange, resulting in the death of the trees. Due to this, the national and local governments prohibited the growing of sweet oranges, grapefruit and mandarins that were grafted on sour oranges.
Argentina has been known as the leading lemon producer and processor country in the world, but lemons are less than half of the total citrus produced in this country. While Argentina is the seventh largest global citrus producing country it is the fourth largest citrus processor in the world after Brazil, USA and Mexico. Located in the southern hemisphere, Argentina has taken advantage of the counter season citrus production to strengthen their fresh fruit exports. This activity drives the production of sweet citrus (oranges, mandarins and grapefruits) producing export quality fruit supplies to both Western and Eastern Europe, with Eastern Europe the stronger destination. Far East is a growing destination for oranges and mandarins.
Argentina presents two distinctive citrus production areas identified as NOA and NEA, which translates into Argentina North West and Argentina North East. The first one is predominantly for lemons and most of the grapefruits, represented 65% of total citrus produced in 2008; the second one is predominately for oranges and most of the mandarins, and during the same period represented 35% of the total citrus. Tucuman is the largest lemon area and Salta is the largest grapefruit area, are located on the NOA, and Entre Rios the largest orange and mandarin area is located on the NEA region.
As a country Argentina processes 43.4% of total crop and uses 49.7% of their crop to serve fresh fruit market, which includes domestic and exported fruit.
Fruit seasonality spreads throughout calendar year, with heavier production and process months during their fall and winter season, extending to some spring weeks, following the same pattern as we have it in Northern Hemisphere. The difference is our counter season between the two hemispheres.

Lemon, grapefruit and mandarins have a distinctive off season periods, while oranges are produced all year round between the western and eastern regions of Argentina.
Fruit production has shown an important growth trend in Argentina for the last 15 years and reaching a leveling period where we can see lower growth rate during the last 4 years, interrupted only in 2008 by adverse weather conditions. The most important growth out of all citrus grown in Argentina is lemon growth, which we can easily see the yellow spike, as the stronger contributor to the average growth of this region. Sweet citrus has been stable with no significant growth through the last few years.
Located in the Southern hemisphere, Argentina has taken advantage of the counter season citrus production to strengthen their fresh fruit exports. This activity drive the production of sweet citrus (oranges, tangerine/mandarins and grapefruits) to produce fresh export quality fruit that is supplied to Europe with Eastern Europe being the dominant destination. In 2008, 61.4% of sweet citrus crops was dedicated to fresh fruit market, domestic and export, as opposed to 32.2% from lemons.

Shipment of citrus was disrupted during the Argentine farm strike, which affected transportation throughout the country for extended periods during March to June of 2008. Transportation has returned to normal since the end of the farm strike.
Fresh fruit exports reflect a combination of Argentina crop size and global demand. While 2008 was a year with a reduced lemon crop; it showed the largest export volume on Argentina records driven by the short supply of other lemon producing countries, which opened the opportunity for Argentina at record prices. Exports not only affected industry during this particular year, but the internal fresh fruit market was also affected. Fresh exports for oranges were not high reflecting short production and average demand.
Oranges represent the largest consumed variety of fresh citrus in the domestic market. Domestic prices for fresh lemons reached several times their historic value last year due to competition with export market; the rest of the varieties stay within the usual price range. It can be observed that tangerines, grapefruits and lemons have an important fresh consumption as well.
On recent years, consumption of oranges was more than double that of tangerines, this last variety is coming down sharply in front of a moderate growth on the fresh export side. Lemons and grapefruits are more consistent with regards to the fresh consumption trends.
On the processing industry side, lemons are the citrus fruit that it is dominant for process. The lemon industry has shown remarkable growth and is one of the main drivers of the economy in Tucumán. This industry employs, both directly and indirectly up to 100,000 people, with 43 functioning lemon packing houses and nine processing companies in Tucumán and a total of eleven companies country wide.

Sweet citrus is about 27% of the total processed sweet citrus in Argentina for 2008. Their product specs are related to the maturity and seasonality that the fresh fruit market demands, then low ratio is dominant and this puts juice out of range for most international acceptance. As a counterbalance, the soft drink industry is regulated to include fruit juice on its formulation.
On this chart we can visualize the dominant role of lemon processing in Argentina over any other citrus variety that it is processed down there. The trend is maintained through the years. The participation in the processing of the other citrus varieties is up and down depending on the demand and spot market conditions.
The ratio of fruit in 2008 for process versus fresh is inverted on lemon and sweet varieties, while lemon process 65% of the fruit, sweet varieties process 27% of their fruit crop. It is important to remark that there are important pre and post harvest loses of fruit on each crop for different reasons; weather, price and quality among them.
In the 1960’s with the importation of more advanced technologies from overseas, lemons began to be grown commercially in Tucumán. It was during this time period that the first facilities that processed lemons were opened in the area. At this point I am going to focus on the lemon industry and start the historical review from 1995; back then all lemon oil production was on the open market.
Let’s take a look at the total world lemon production in 1995. The total at that time was 3.036 million metric tons which was about 60% for the fresh market and 40% for the processing industry.
Here we have the division between fresh and processing industries in these five important lemon producing countries (Argentina, Italy, Spain, USA and Turkey) back in 1995. In Argentina 25-30% of the crop went to fresh which is also the case today. In Italy the ratio can be as high as 50% but they usually process around 60-65% of the total crop. In Spain, they are focused primarily on the fresh market and around 20% of the crop goes to processing. In the USA, 60-70% of the crop will be sent to the fresh market depending on the year. I mention Turkey because although they do not process any lemons or provide us any lemon oil, their crop does impact the global situation.
Shown differently now, of the lemons processed into lemon oil, Argentina is the leader at 37%, followed by USA at 28%, Italy at 25% and Spain at 10%.
After a vigorous growth of lemon processing from 1995 through 2006, particularly in Argentina, an adjustment period of the industry took place and market share changed.
Lemon cultivation is stable in traditional growing regions and the lemon oil available on the open market has stabilized. Weather has been a huge factor in every part of the world. Small reductions in crop size from one or two areas can have a significant impact on supply. All of our costs are increasing. The currency and credit issues are affecting all of us and impacting the way we do business. Prices have increased dramatically.
However, translating that into lemon oil production, you can see two things. First, the lemon oil production has increased slightly. That can be attributed to improved technology. Many factories are moving towards more efficient oil extraction equipment which greatly improves the oil yield. Second, the oil available on the open market decreased again in 2007 and 2008 because of weather-related issues.
I want to briefly discuss agricultural residues (ARs). There is an inherent conflict between the requirements of fresh fruit customers and lemon oil customers. Fresh fruit clients want aesthetically pleasing fruit which requires the use of agrochemicals. Lemon oil clients have specifications that allow only very low levels of ARs. Some farmers and processors which are focused on the fresh market have difficulty producing “clean” oil. Argentina has been a leader in the reduction of ARs. Long ago they began to reduce the use of Agrochemicals in the fields.
Several years ago they began converting their packing houses so that post harvest chemicals were applied after the sorting process. Typically Argentina is the source for very clean oil. This year, with such a huge focus on fresh there were some issues. Some used substances that are not globally accepted. Adding to this, some approved substances are beginning to lose their effectiveness and other compounds need to be applied. The message is to please be diligent in your testing protocol and support AR reduction with your suppliers.
The industry has gone through an important transformation and integration process, where plants are larger and better equipped not just to process citrus but to resolve environmental and energy issues.
The industry vertical integration level is high, incorporating cooperatives and packaging plants moving forward in the chain of industrializing their fruit production.
There are about 72 registered exporting packing houses in Argentina, 43 of them devoted to lemon. The largest industries are related to their own packing house and process their own packing house eliminations. Some independent packinghouse are trying to integrate their business and are installing small process operations in front of historical low prices that industry was able to afford. Today industry has recognized an important price increase to the purchase of packing house eliminations as a result of better byproduct market prices, high demand and recognition of internal production cost affected by high inflation numbers.
The largest volume of sweet citrus crop end up being consumed as fresh fruit, about 25% of this sweet fresh fruit is exported and the balance or, 75%, gets consumed by the domestic market. This strong volume determines fruit characteristics for processing as packing houses establish harvest season and elimination fruit end up at the processing plants. Due to the counter season of the Southern hemisphere, fruit seasonality in Argentina is conditioned by fresh export time frame. While this fruit does not compete with Northern hemisphere production, the result is fruit with low ratio characteristics that fall out of most international specs for processing.
The lemon side of the citrus industry has devoted a lot of time and effort understanding fruit characteristics. Technology has developed systems that benefit from this knowledge and allow process to be adjusted to maintain high consistency on top extraction performance. During last few years, this analysis has shown that Lisboa and Eureka lemon varieties have shown the highest juice content, while Limoneira is the highest in acidity and oil content.
Here we see the quantitative comparison where Limoneira and Lisboa are practically at the same oil level content, however Limoneira brings more aldehydes to the oil, which generates added value to this variety.
During 2005 and 2006 Lisboa had more juice content and on 2007 and 2008 Eureka was leading in juice content, displaying a close difference in the last four years average. Limoneira was the variety that reported more acidity, but this increase in acidity wasn’t enough to match the juice content difference with leading varieties.
In summary, the most profitable variety in today’s market environment is Lisboa, almost as good as Limoneira in oil content, but with the largest juice content contribution of the four varieties under this analysis.
Juice production is following the trend of increased process volume with the plus of reaching higher juice yields due to improved technology. In 2009 due to higher juice content on the fruit, it broke all-time yield record with 72 kg of concentrated 400 GPL low pulp juice per metric ton throughout this season, having less than 20% of the crop to go. Performance data for sweet citrus is very scarce.
Oil production has the same trend as juice, and it is interesting to see that also in 2009 new oil recovery throughout 80% of the season is reported to be over 6.0 Kgs per metric ton on the drum. This is a great year for process yields and performances that are going to offset some of the reduced crop forecast due to the last freeze in July.
On historic average, each ton of fruit yields 55-66 kg of lemon juice, 3.5-5.5 kg of lemon oil and 52-54 kg of lemon peel for pectin recovery. There are different types of concentrated lemon juice: turbid, clarified, of different acidity degrees. Special products are also elaborated according to the customers’ preference. This juice yield translates into close of 17 MT of fruit to produce 1 MT of lemon juice concentrate at 400 GPLs. This year fruit has higher acidity and juice content was able to use only 14 MT of fruit to produce 1 MT of lemon juice concentrate. Argentine juice is of exceptional quality due to its color, flavor, pulp proportion and the soluble/acidity solids relationship, which are of great advantage in the international market.
Orange byproduct yield per MT of fruit

- 50-69 kg FCOJ
- 3.0 – 6.0 Kg Orange oil

Orange juice production in Argentina shows low juice yields in general, possibly due to the harvest seasonality and low ratio fruit that gets processed. Also, no peel gets processed for pectin recovery on oranges.
Grapefruit concentrated juice shows better yields. However, grapefruit juice ratio is extremely low, most of the time it is under 8. Grapefruit oil recovery is the lowest of all citrus due to lower oil availability on the fruit and unfortunately oil prices on recent years are not supporting profitability on grapefruit oil recovery systems. Average processed grapefruit volume is about half of orange processed volume.
The lowest process volume of all citrus varieties is Tangerines. Juice yield suffers due to the soft skin that makes it very difficult to process. Oil recovery is average but the value of the oil is low due to mixing of different varieties during processing making it complicated to keep high value varieties separated. This is a consequence of processing low volume of fruit.
As the diseases map of the citrus world keeps progressing with new affected areas, Argentina has managed to stay free of Greening for the time being. Tristeza killed all of the sour orange rootstock trees in the thirties and since then only resistant rootstocks are being used. Because Argentina is such a fresh fruit exporter it has been their priority to stay free of any major diseases that could create a commercial impact or potential spread risk. Canker the only current disease is tightly controlled and monitored to prevent it from spreading, and to keep their fresh fruit exporter status.
New technology is available for lemon processing is setting a new level of performance and unseen oil and juice extraction yields, contributing to the competitiveness of this region of the world. New agricultural practices are in place to reduce and control agricultural residues that affect the marketing of byproduct. Today, all the emphasis of this control is over citrus oils, tomorrow it could be over citrus juices as well. Documentation and certification at plant levels increase the confidence in negotiating with Argentinean companies as they progress in many standardization practices such as ISO 9000 and ISO 14000 and, different certification processes. Carbon reduction certification will certify that some of the greenhouse gas emissions produced from running their business is offset through the funding of energy efficiency and renewable energy installations.
There is good news regarding future trends.
Europe is enjoying resurgence, and I understand that there are a couple of new factories in Spain. Due to a recent anti-dumping issue, floor prices have been established for juice in the US which should really help everyone. Fresh demand continues to grow. The investment is very strong there. Old equipment is being replaced with new more efficient models. There is a focus on effluent treatment systems which we as an industry need to support. Several new factories have popped up in Argentina as well. All of the origins are working towards reducing ARs.
More good news is that soft drink volumes are predicted to grow by 9% from 2007 through 2012.

### Global Carbonated Soft Drinks Volume

<table>
<thead>
<tr>
<th>Region</th>
<th>2002</th>
<th>2007</th>
<th>2012 - Forecast</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asia Pacific</td>
<td>21,427</td>
<td>25,477</td>
<td>30,067</td>
</tr>
<tr>
<td>Australasia</td>
<td>2,306</td>
<td>2,368</td>
<td>2,342</td>
</tr>
<tr>
<td>Eastern Europe</td>
<td>9,863</td>
<td>12,627</td>
<td>15,090</td>
</tr>
<tr>
<td>Latin America</td>
<td>39,977</td>
<td>49,170</td>
<td>55,943</td>
</tr>
<tr>
<td>Middle East / Africa</td>
<td>16,718</td>
<td>20,305</td>
<td>25,634</td>
</tr>
<tr>
<td>North America</td>
<td>58,907</td>
<td>58,535</td>
<td>53,862</td>
</tr>
<tr>
<td>Western Europe</td>
<td>28,863</td>
<td>32,339</td>
<td>35,504</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>178,061</td>
<td>200,820</td>
<td>218,441 (+9%)</td>
</tr>
<tr>
<td><strong>Cola</strong></td>
<td>102,768</td>
<td>114,110</td>
<td>123,850</td>
</tr>
<tr>
<td><strong>Non-Cola</strong></td>
<td>75,113</td>
<td>86,719</td>
<td>94,591</td>
</tr>
</tbody>
</table>

Source: Euromonitor International
Argentina has had an explosive citrus industry growth period on their production and process driven mostly by lemon oil demand, followed by an adjustment period. This has brought Argentina globally, from a 37% processed lemons 15 years ago, to a current standing of about 53% or more depending on weather conditions affecting different growing regions around the world. Climate conditions have played an unusual alignment in 2008 affecting most producing lemon areas around the globe, and creating an unprecedented rise in lemon byproduct marketing. This is causing great instability to the supply and affecting final consumption. Lemon byproduct reached prices never seen before in this industry. This year, with weather returning to more normal conditions, we will see a struggle to define a fair market price. There are many supply and demand factors that are affecting a final settlement that can satisfy both sides of the equation. The second half of this year in Tucuman, Argentina, a freeze affected the main lemon producing area bringing new price negotiations conditions and revised forecasted process volume.

The 2009 lemon crop in Argentina is progressing fairly well, although the crop is now not expected to be as good as first thought. There are two reasons for this; the first one is a drought situation followed by a freeze during last days of July.
To correct natural deficiencies of fruit juices, lemon juice has proven to be a good natural acidulant. After sweetness the second most important feature of a soft drink or juice drink beverage is acidity which balances sweetness to the desired Brix to Acid ratio. High acid apple juice is in particularly high demand in Japan and European markets.
### 2009 Outlook

#### Processed Lemons

<table>
<thead>
<tr>
<th>Country</th>
<th>2008</th>
<th>2009</th>
<th>% Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Argentina</td>
<td>889,600</td>
<td>1,180,000</td>
<td>33%</td>
</tr>
<tr>
<td>Brazil</td>
<td>100,000</td>
<td>100,000</td>
<td>0%</td>
</tr>
<tr>
<td>Italy</td>
<td>90,000</td>
<td>275,000</td>
<td>206%</td>
</tr>
<tr>
<td>Mexico</td>
<td>117,000</td>
<td>100,000</td>
<td>-15%</td>
</tr>
<tr>
<td>Spain</td>
<td>60,000</td>
<td>200,000</td>
<td>233%</td>
</tr>
<tr>
<td>South Africa</td>
<td>80,000</td>
<td>80,000</td>
<td>0%</td>
</tr>
<tr>
<td>USA</td>
<td>185,000</td>
<td>292,000</td>
<td>58%</td>
</tr>
<tr>
<td>Total Processed</td>
<td>1,521,600</td>
<td>2,227,000</td>
<td>46%</td>
</tr>
<tr>
<td>Oil Production</td>
<td>5,659</td>
<td>8,282</td>
<td>46%</td>
</tr>
</tbody>
</table>

2008 short production due to weather conditions is back to full level in 2009 and maintain it’s growth trend, becoming the largest world lemon crop ever recorded. In consequence there is going to be a record by-products production and we will see prices settling down to a more reasonable level. Future proof that the market has reached a maturity level. Variances will continue to occur due to the fact that supply has a low response time depending on the growth time for new groves; however demand seems to be in a market niche of beverage business that it is not easily impacted by world economic conditions.
Let’s take a look at where the growth occurred. Here are the three “new origins” (Brazil, Mexico and South Africa). You can see from this graph that growth has taken place in each country during the growth phase but has since leveled off. It is also important to note that the total volume processed between all three countries on a good year is around 240,000mt. To put that in perspective, several factories in Argentina can individually process that volume and more in one season. So, although these countries have been added to the picture, their impact is not that great.
Three of the primary sources for lemons are Italy, Spain and USA; none of which experienced any growth during this period, and in some cases, a decline trend can be seen.
Bad weather conditions during 2007/08 season created a large reduction of processing volume. Similar weather related issues in other lemon producing areas of the world contributed to put some pressure on Argentina for fresh fruit supply resulting in very low processing volume. Several new processors entered to compete for reduced crop. 2009 is indicating a full recovery, leaving the rest of the world with extra margin from reduced fresh exports. Prices will return to regular levels but internal inflation and economic factors will present a challenge for non integrated industries.
Argentina maintains a dominating position with opportunities to grow. New prices will determine the interest to maintain expansion plans, or level off current processing volumes. Small new processors will have more difficulty adjusting to new market prices, and are integrating their plants with all by-products. Economic factors will play an important role as Argentinean currency maintains a strong position in front of their internal inflation. Demand needs to maintain their consumption trend; otherwise prices will crash affecting industry in general.
Lemon oil prices were around $25 to $30 USD at the beginning of the season and there are expectations of seeing these prices on the low $20’s or high $10’s if this good crop gets processed and world process volume hits the new mark of 2 million metric tons. Recent freeze and adverse weather conditions will create a new struggle to find a fair middle point, which is believed to land in the low to mid $20’s.
Weather is always going to be a factor but perhaps more so now. We know that there is citrus in China and India and we need to follow how those industries will develop and impact the markets. The Western world will be under continued pressure from land development, environmental restrictions and struggle with competitiveness. For these reasons and others, as an industry we must support all of the growing regions and multiple suppliers. It is clear that 2008 was a disaster. I have explained some other factors affecting the market. However, looking at the volume of lemon oil that could be produced in a normal year, I believe that supply and demand balance could be near. Mother Nature has the last word on that though. Undoubtedly some new planting is going to take place. Hopefully that will be well planned and controlled. Finally, there is a global awareness of the need to be green. With the green movement comes the demand for natural products. What could be more natural than a lemon?

Argentina will be consolidated as the main lemon producer and processor of the world. Lemon oil is benefiting from a resurgence on soft drink market. Lemon juice from being a byproduct of Argentina’s industry has become to be the main revenue generator for this activity; where new applications on lemon juice to correct natural deficiencies of fruit juices have proven to be a good natural acidulant. Processing equipment is being replaced with new and modern technology, an improved processing culture is paying attention to process efficiencies and environmental protection and agricultural residues are being closely watched, making this region the leader of safe practices globally. Sweet citrus juices from Argentina have developed a niche market due to unique specs resulting from processing fruit based on fresh fruit market needs and demands.
Special thanks to Suzy Nolan for her contribution, she is the General Manager of Lionel Hitchen USA, Ltd., based in Sarasota Florida, also to Vivian Glueck, from Citroil Enterprises, and Juan Carlos Gonzalez and Julieta Migliavacca, from Citrusvil, for their collaboration.
Thank you,

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Victor Onchi Navarro
Sr. Vice President Latin America
Brown International Corporation, LLC
victor.o@brown-intl.com