



# Global Berry Congress

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## Presentation Outline

- Introduction to Transfresh Corporation
- Post Harvest Treatments
- Technology Applications
- Global Market Data



## Introduction

**An international leader in transportation and storage solutions for perishable produce**

- ✓ 50 years of continuous innovation
- ✓ Shipping 500,000+ tons of highest quality chilled perishables annually
- ✓ 500 million kilograms of fresh berries serviced each year



## Key Strengths

- ✓ Global Service Network for year-round accessibility
- ✓ Post-harvest knowledge & cold-chain management optimizes commodity-specific freshness
- ✓ Customized technology application reduces shrink and extends shelf life
- ✓ Proven customer profitability and results





# Post-harvest Knowledge

## Research & Development / Packaging Locations

Integrated capabilities drive optimal post-harvest knowledge application





# Global Service Network

## Year-round Accessibility





## Growth in Consumption

Raspberries 300%

Blueberries 65%

Strawberries 45%





# Harvest and Packing House



## Harvest & Post-Harvest Practices

### Harvest

- Minimize Handling

*Fruit should be harvest in small containers to minimize bruises and mechanical damage*

- **Variety** Specific

*Some varieties may be picked and soon after turn dark blue and some varieties are not ripe even though they have turned dark blue*

### Cooling

- Cool fruit to 0°C (32°F) as quickly as possible after harvest.



## Causes of Deterioration

- ✓ **Decay (Botrytis, Cladosporium)**
- ✓ **Softening**
- ✓ **Dehydration**
- ✓ **Mechanical Damage**



## Causes of Deterioration

- ✓ **Decay (Botrytis, Cladosporium)**
  - Growing conditions  
(rain, humidity, temperature)
  - Level of spores in the harvest process  
(farm or packing house)
  - Susceptibility of the specific **variety**  
(tissue)



## Causes of Deterioration

### ✓ Softening

- Advanced maturity at harvest.
- Cooling process: needs to be quick, especially if harvest occurs at high environmental temperatures
- Technology application
- **Varietal** susceptibility – turning color



## Causes of Deterioration

### ✓ Dehydration

- Advanced maturity at harvest increases the problem
- Cooling process: more time without cooling increases dehydration
- Humidity control during storage
- **Varietal** susceptibility



## Causes of Deterioration

### ✓ Mechanical Damage

- Harvest technique
- Higher Maturity = More susceptibility
- Varietal susceptibility



## Major Factors Impacting Fruit during Transit

✓ **Temperature of Product and Reefer**

*-0.5C to 1C*

✓ **Technology Used**

- Controlled Atmosphere
- Modified Atmosphere

*O<sub>2</sub> is decreased from 21% to 5-8%*

*CO<sub>2</sub> is increased from 0.03% up to 10 -15%*

✓ **Transit Time**

*2-35 days*



## Base Technology

The science behind choosing the best technology

- ✓ USDA Handbook #66: *“High levels of CO<sub>2</sub> (10-30%) reduce the activity of decay organisms...extending market life.”*
- ✓ USDA (AATW July 1980): *“Decay reduction was greater when CO<sub>2</sub> levels...were maintained at or above 10%.”*
- ✓ CO<sub>2</sub> levels must be maintained at 10% or higher to inhibit decay (botrytis) and wet and leaky conditions.  
*Source: UC Davis, Strawberry Fact Sheet.*
- ✓ **Regular atmosphere air contains only .03% Carbon Dioxide (CO<sub>2</sub>)**

**UCDAVIS**

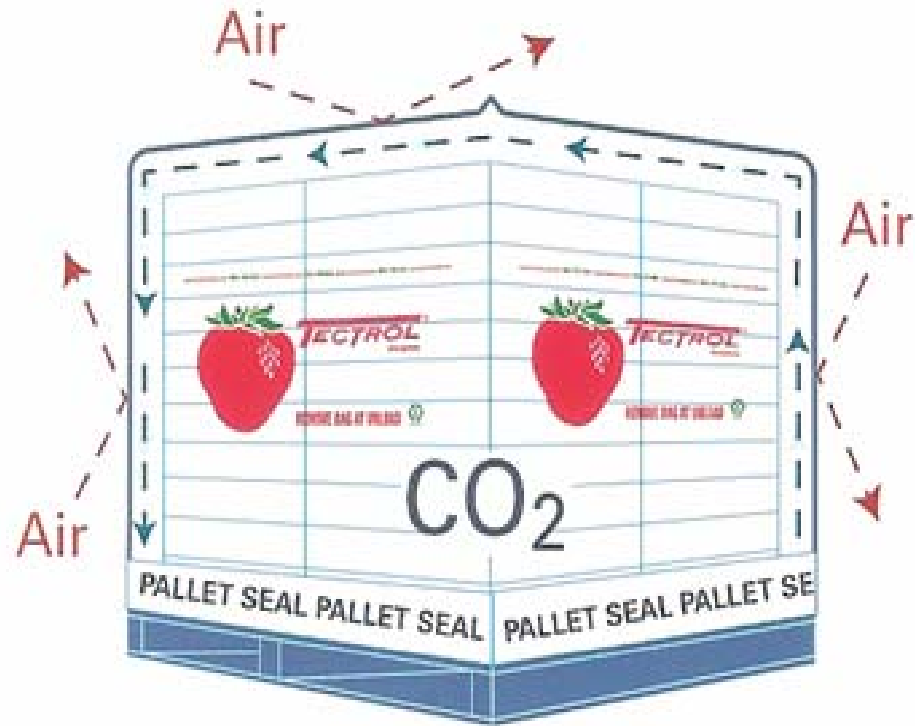




# Technologies and R and D Developments



## Modified Atmosphere

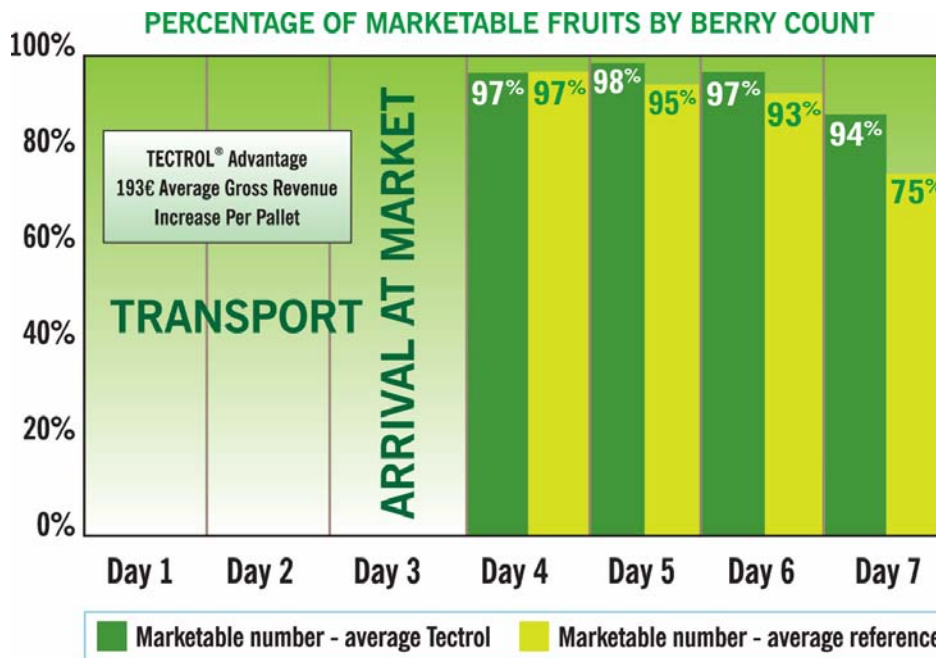


Transits between 2-7 days



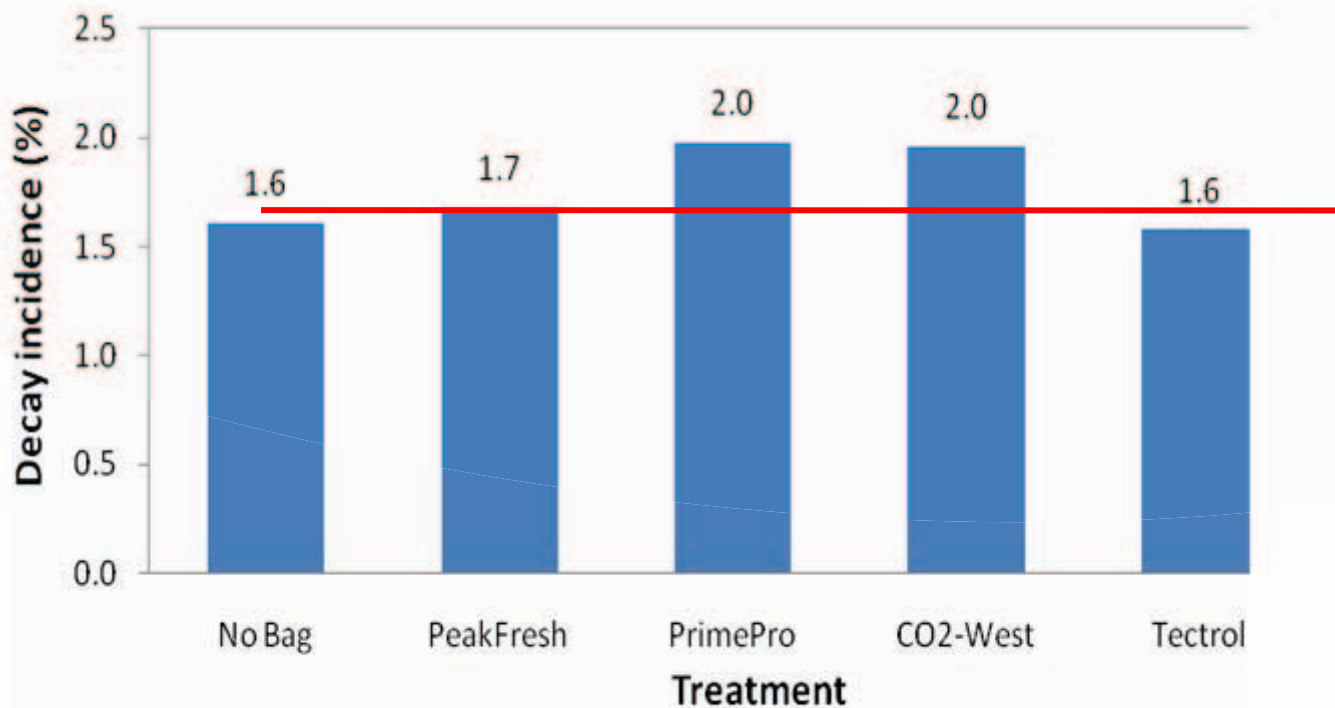
# Delivering Results

- Reduction in decay
- 19% More marketable fruit





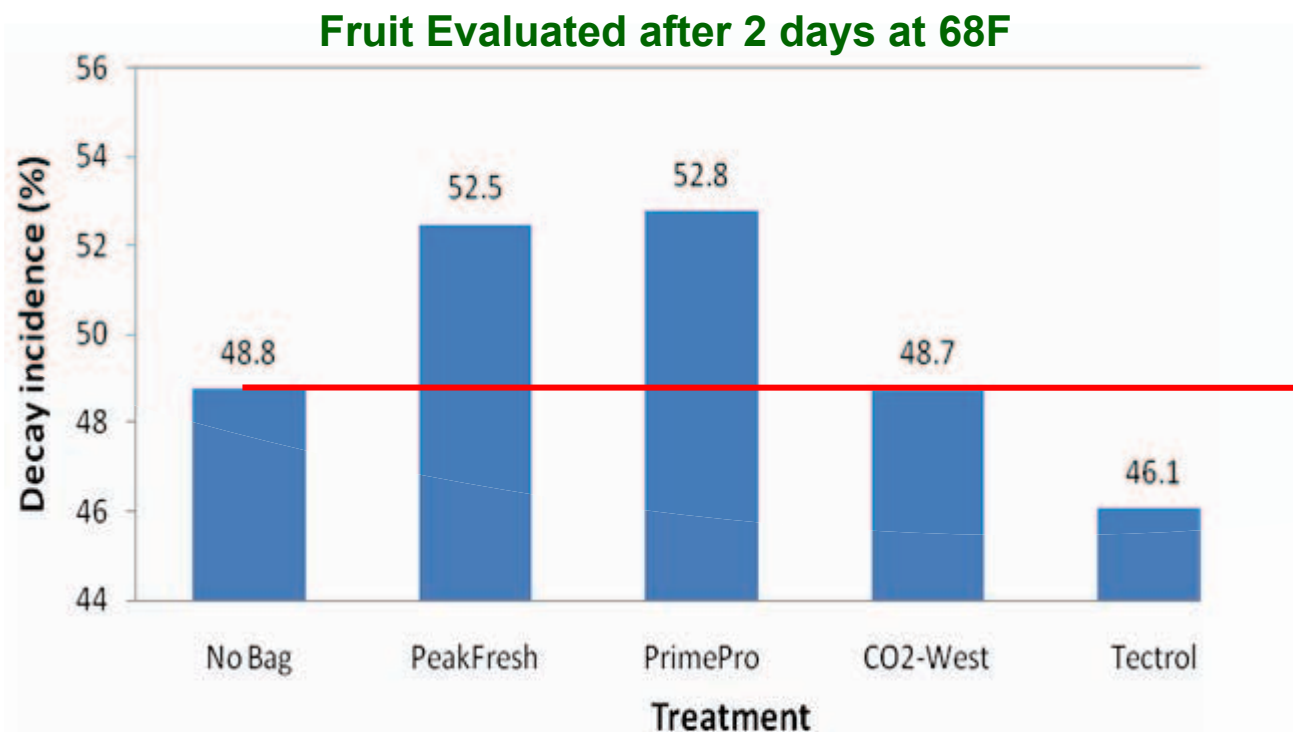
## Fruit Decay Incidence on Arrival — UC Study



**Figure 4.** Decay incidence (%) in fruit evaluated on arrival. Each bar represents the mean value of three shipments.



## Fruit Decay Incidence 2 days After Arrival— UC Study

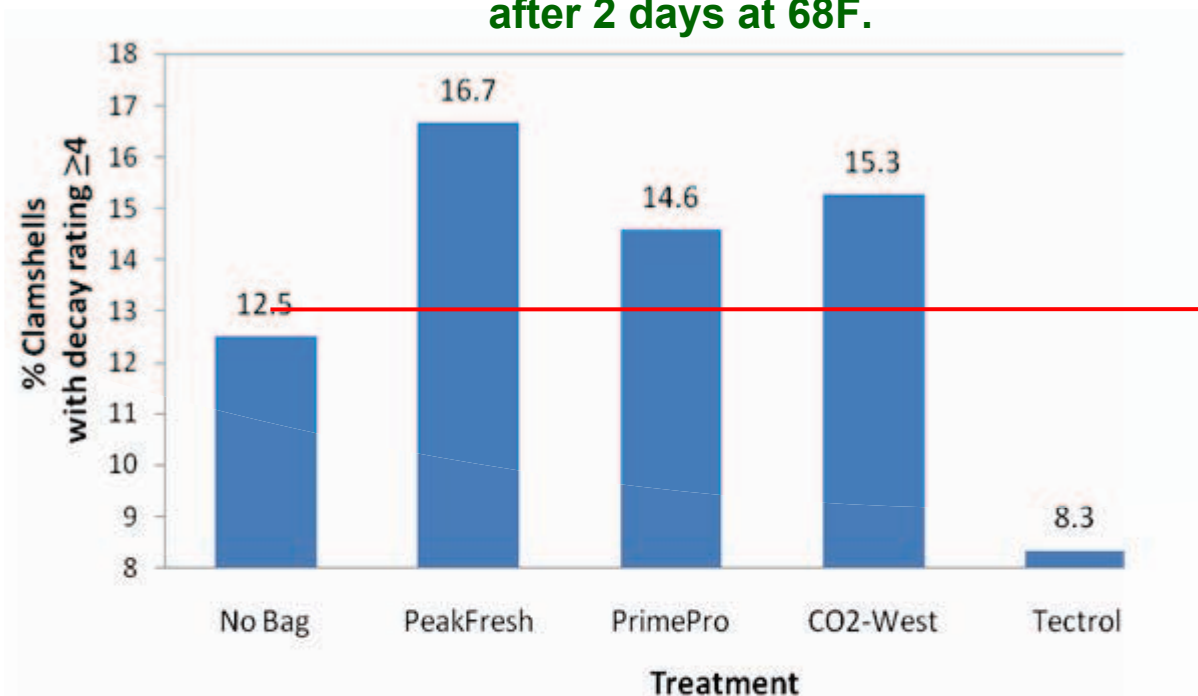


**Figure 5.** Decay incidence (%) in fruit evaluated after 2 days at 68°F. Each bar represents the mean value of three shipments.



## Fruit Decay Incidence 2 days After Arrival — UC Study

Severity of decay as measured by clamshell  
after 2 days at 68F.



**Figure 6.** Percentage of clamshells with decay rating of  $\geq 4$  after 2 days at 68°F (Scale from 0 = no decay to 5 = sporulation). Each bar represents mean value of three shipments.



## Benefits to Modified Atmosphere Technology

- High humidity transport
- Allows various volume levels
- Mix product with same temperature requirements
- Ability to store product – market supply

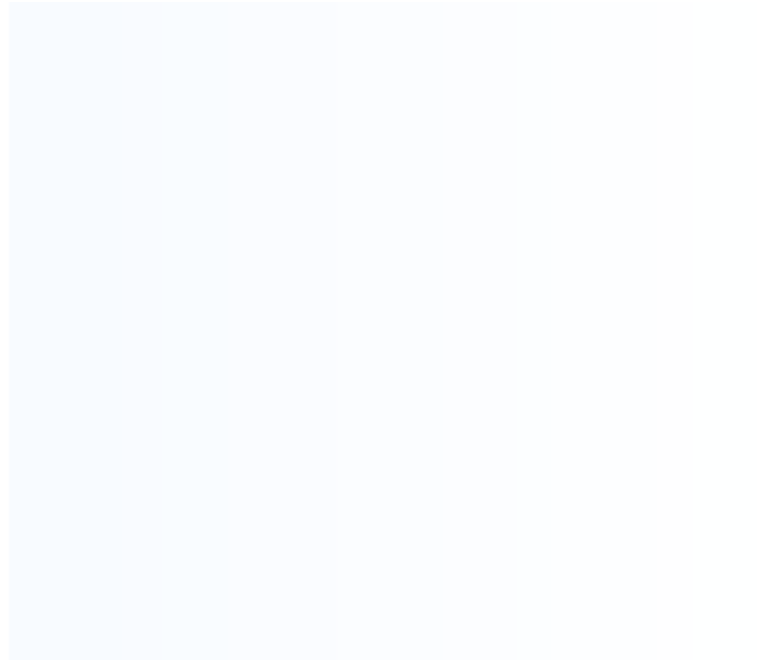


# Blueberries





# Controlled Atmosphere



Transits between 7-30 days



## Blueberry Results in Atmosphere

- Moderate respiration rate: sealing is critical
- Beneficial high carbon dioxide: over 10% to control decay and delay ripening
- Low Oxygen: 4-6%





## Volume Exported Chile & Argentina (tons)

Season	Argentina	Chile	Arg + Chile
03-04	940	9.467	10.407
04-05	1.709	11.334	13.043
05-06	3.530	15.066	18.596
06-07	6.599	21.188	27.787
07-08	7.000	29.000	36.000
08-09	12.000	39.000	51.000
09-10	11.200	48.892	60.092





# Destination Markets

## Chile

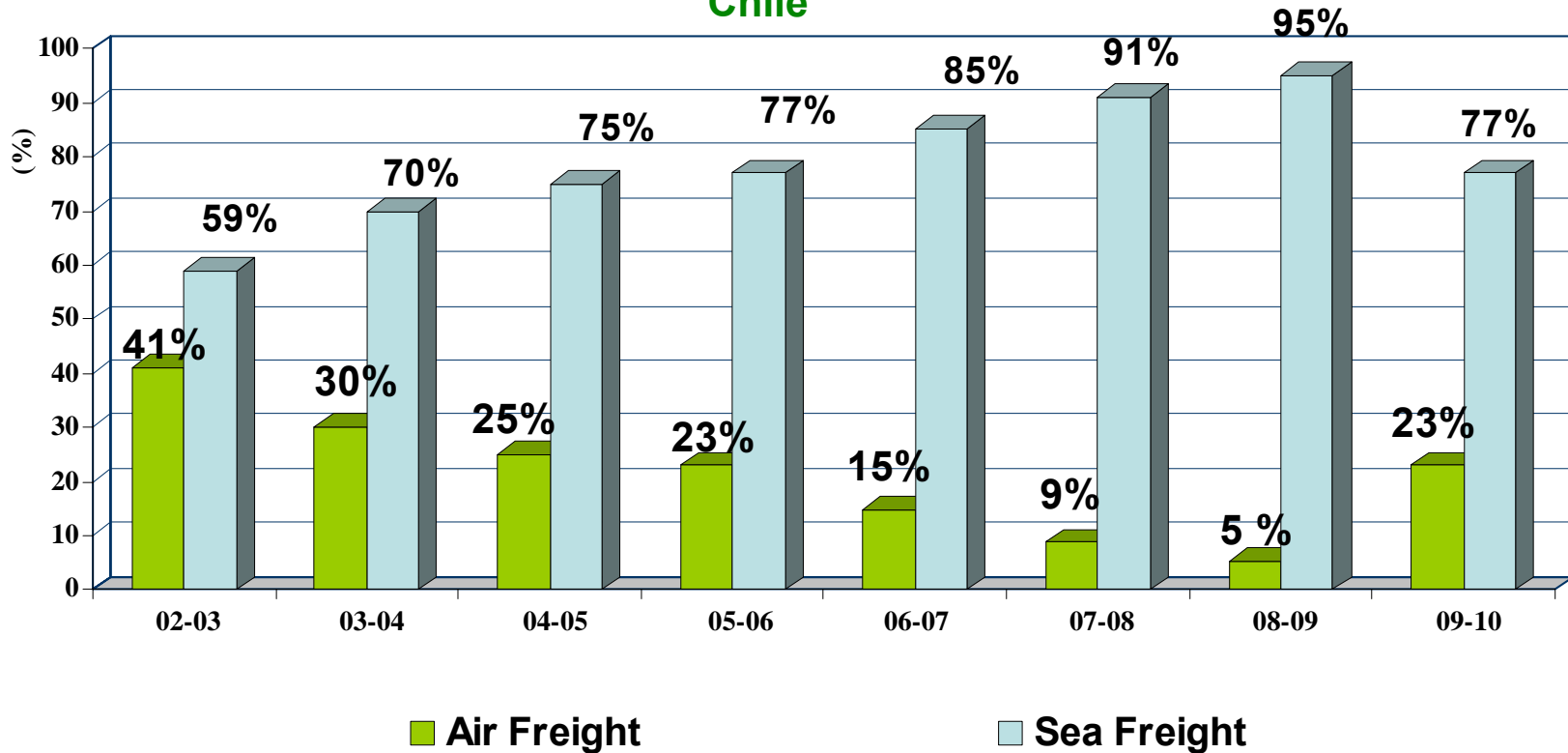
Season	U.S.		Europe		Far East	
	Tons	share %	Tons	share %	Tons	share %
03-04	8.323	87,92%	779	8,23%	355	3,75%
04-05	9.440	83,29%	1.560	13,76%	321	2,83%
05-06	12.033	79,87%	2.611	17,33%	390	2,59%
06-07	22.040	76,00%	5.425	18,00%	1.740,0	6,00%
08-09	35.194	84.40%	5.263	12.63%	1.084	2.6%
09-10	40.343	82,52%	7.033	14,39%	1.439	2,94%





# Transportation Methods Chile

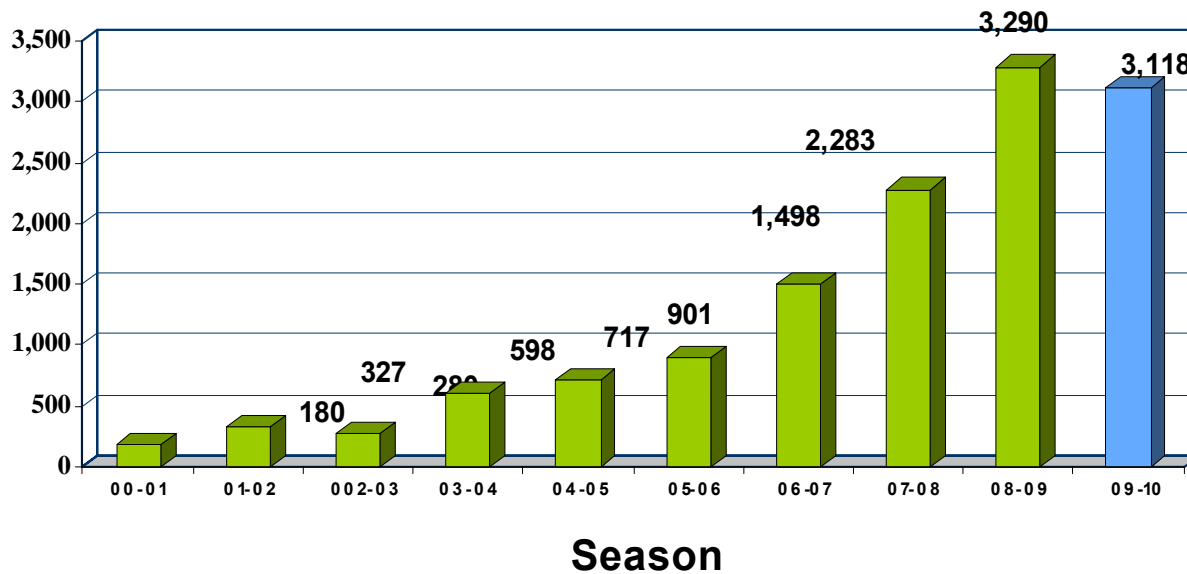
## Air Freight vs Sea Freight Chile





## Blueberries transported by Sea from Chile (CA / MA – Containers 40’')

Containers 40 ft





## Benefits to Controlled Atmosphere Technology

- High humidity transport
- Best temperature control with reefer container
- Lower freight costs vs air
- Lower risk/more atmosphere control
- Record of atmosphere levels and trip performance



## Critical Aspects

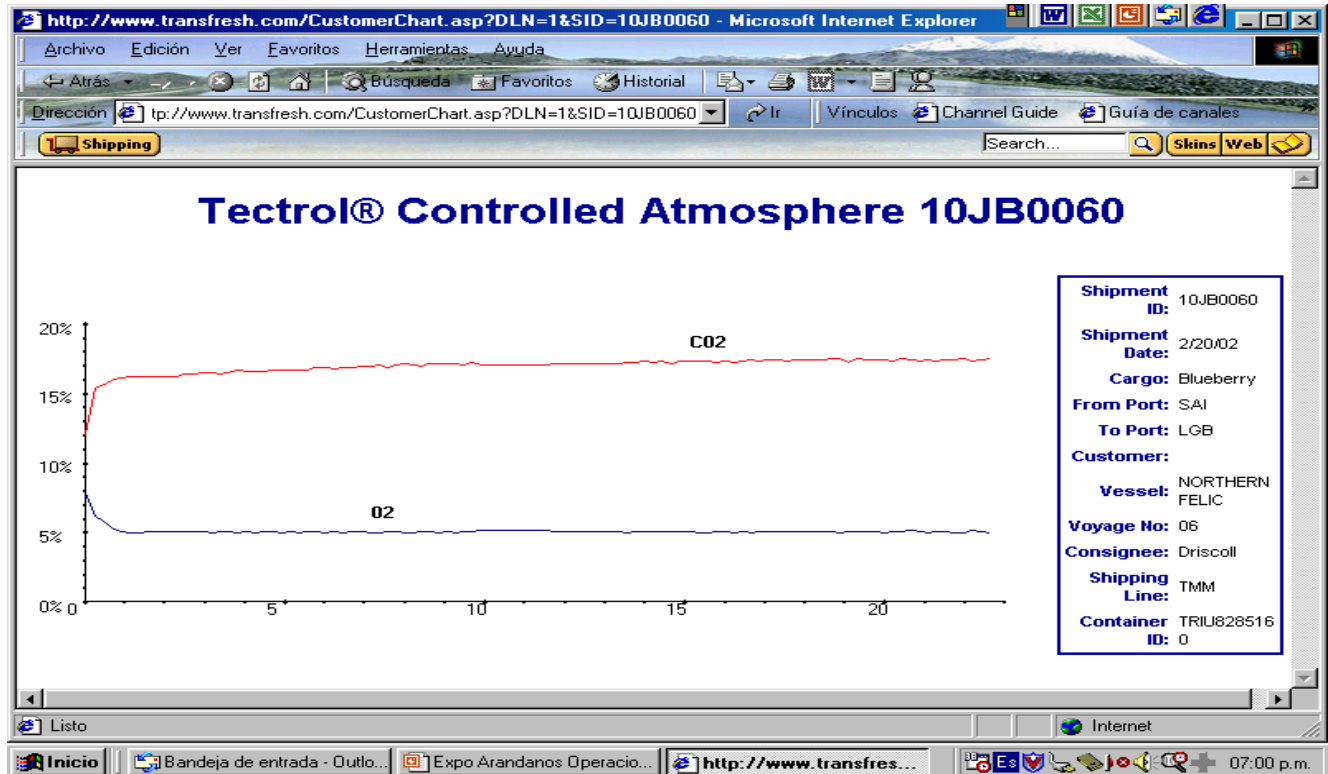
### Critical aspects to consider when choosing a technology :

- How long does it take to establish the optimum atmosphere set points?
- What technology offers the right mix: high CO<sub>2</sub> and low O<sub>2</sub>?
- What is the level of CO<sub>2</sub> control during voyage -7-35 days?
- How often does the system need to make atmosphere adjustments?
- Are atmosphere performance charts provided?



## Critical Aspects

Critical Aspects while using CA  
Is the information available for customers?





## Why is transportation for berries so important?

- ✓ Harvest: 1 day
- ✓ Selection & Packaging: 1 day
- ✓ Cooling: ½ day
- ✓ Container Loading: 1 day
- ✓ Transit Time: 2-30 days



# Thank You

