

OVERVIEW OF THE GREENHOUSE (GH) VEGETABLE INDUSTRY: Focus on Tomatoes

by

Roberta Cook

**Department of Agricultural and
Resource Economics**

University of California, Davis

September 11, 2006

for

**The IR-4 Project Greenhouse Grown Food
Crops Workshop On Pest Control**

Estimated Global Covered Horticultural Area, 2004, 1000 Hectares

Region	Glass	Plastic GH and Large Tunnels	Small Plastic Tunnels	Plastic Mulching
Asia	2.476	926.0	665.0	10,000.0
Europe	28.922	171.5	92.0	400.0
Africa/Middle East	6.682	50.6	112.0	80.0
N. America	1.350	11.05	20.0	260.0
Central/S. America	N.A.	9.51	11.0	6.0
World Total	39.430	1,168.66	900.0	10,500.0

Source: Rabobank 2006, The World of Vegetables

US Ag Census Results

- 2002 greenhouse veg area 579 hectares (+ >50 since) vs. 370 in 1997 Ag Census
- But this is: under glass or other protection so may include some shade house
- While precise statistics don't exist, we know that greenhouse area and production are increasing, with tomatoes the vast majority of area

Overview

- Europe developed the US GH market
- Within N. America Canada started production first, followed by the US
- It is increasingly a N. American industry
- Market has been saturating at retail for tomatoes
- Foodservice market not yet developed for GH and foodservice is the high growth rate market – savior of the field tomato industry

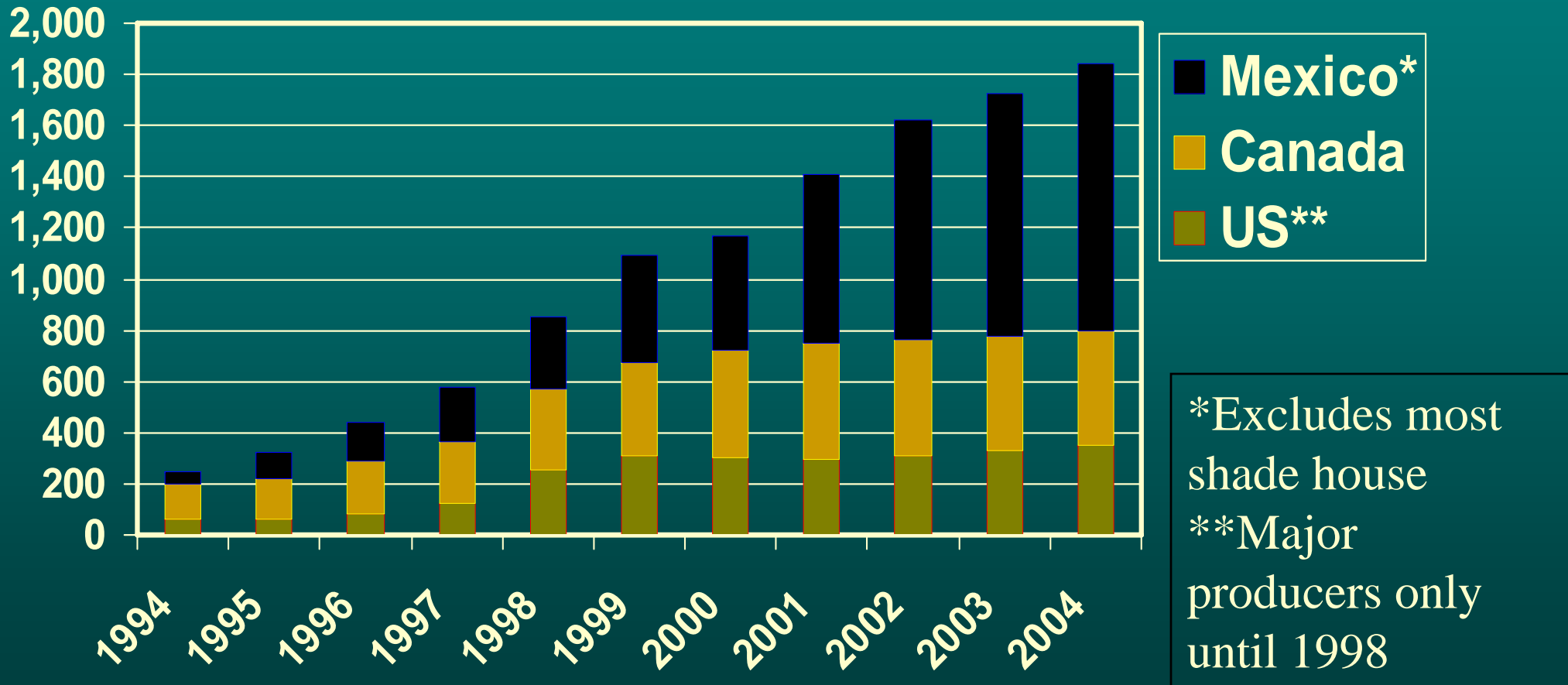
Overview

- Mexico is a latecomer in GH, it's advantage is the ability to produce for the high-priced winter market
- Rapidly expanding winter production is bringing prices down
- GH prices still very dependent on field volume and weather shocks
- Greenhouse production is still seasonal and weather impacted after all, despite being grown indoors

Overview

- **Hard to deliver volume and quality for newcomers, learning curve!**
- **Canada and the US already went through the learning process, with many failures in the US, and a shift to the right locations in the west and southwest**
- **Disease pressure if open field ag is nearby**
- **Market windows are mainly gone; need to extend the shipping season to recover high fixed and variable costs of greenhouse production – boosting supply and creating price pressure**
- **Consolidated buyers look for big marketers capable of offering year-round production and contracts – alliances are happening, not yet proven**
- **Retail demand for GH tomatoes is beginning to saturate after explosive growth in the 90s, whereas growth in GH cukes and peppers is on the upswing**

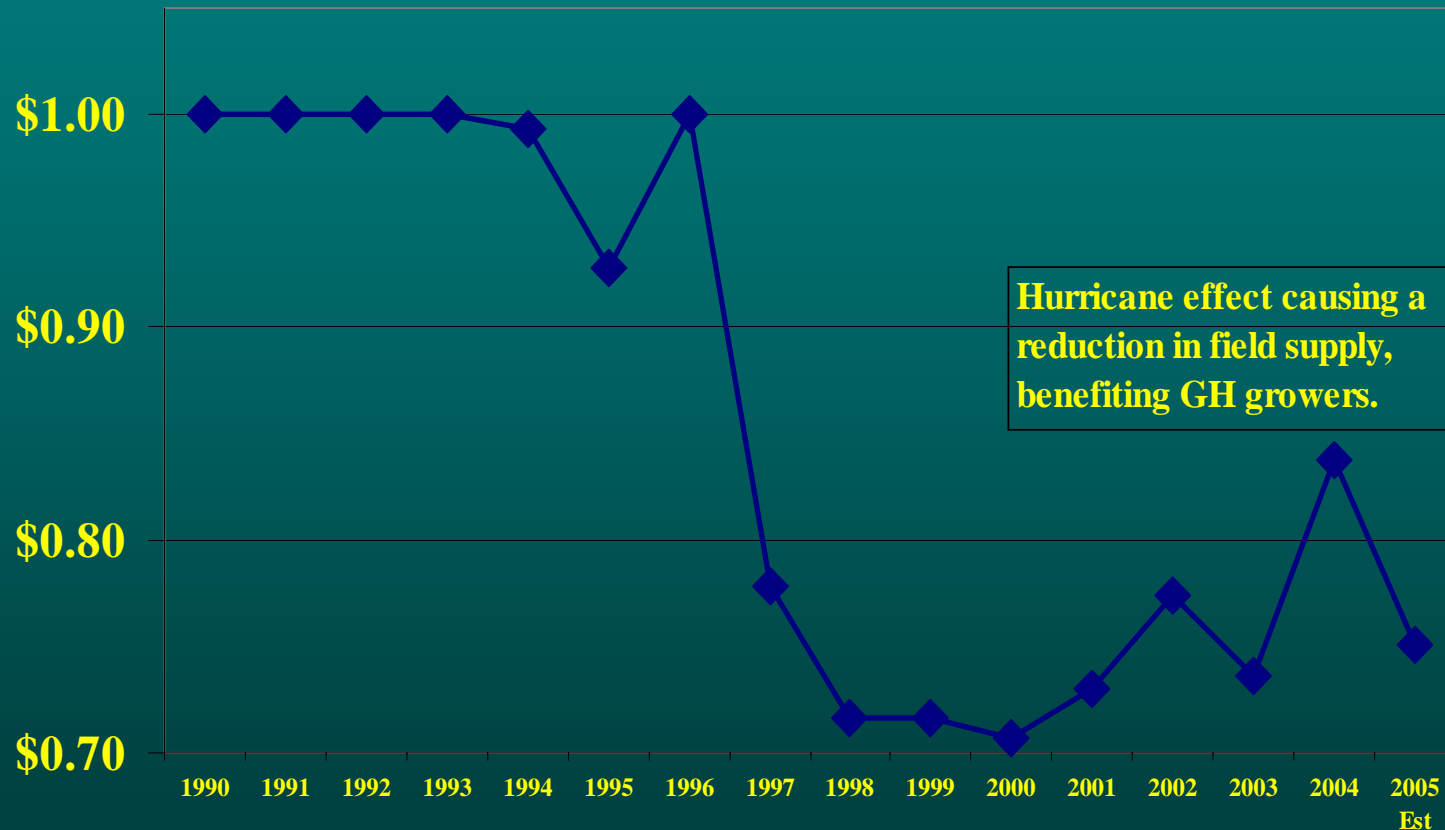
Estimated trends in N. American greenhouse tomato area,¹ hectares



¹ Preliminary estimate for Mexico in 2004

Sources: ITC, AMPHI, Stat Canada, and Calvin and Cook

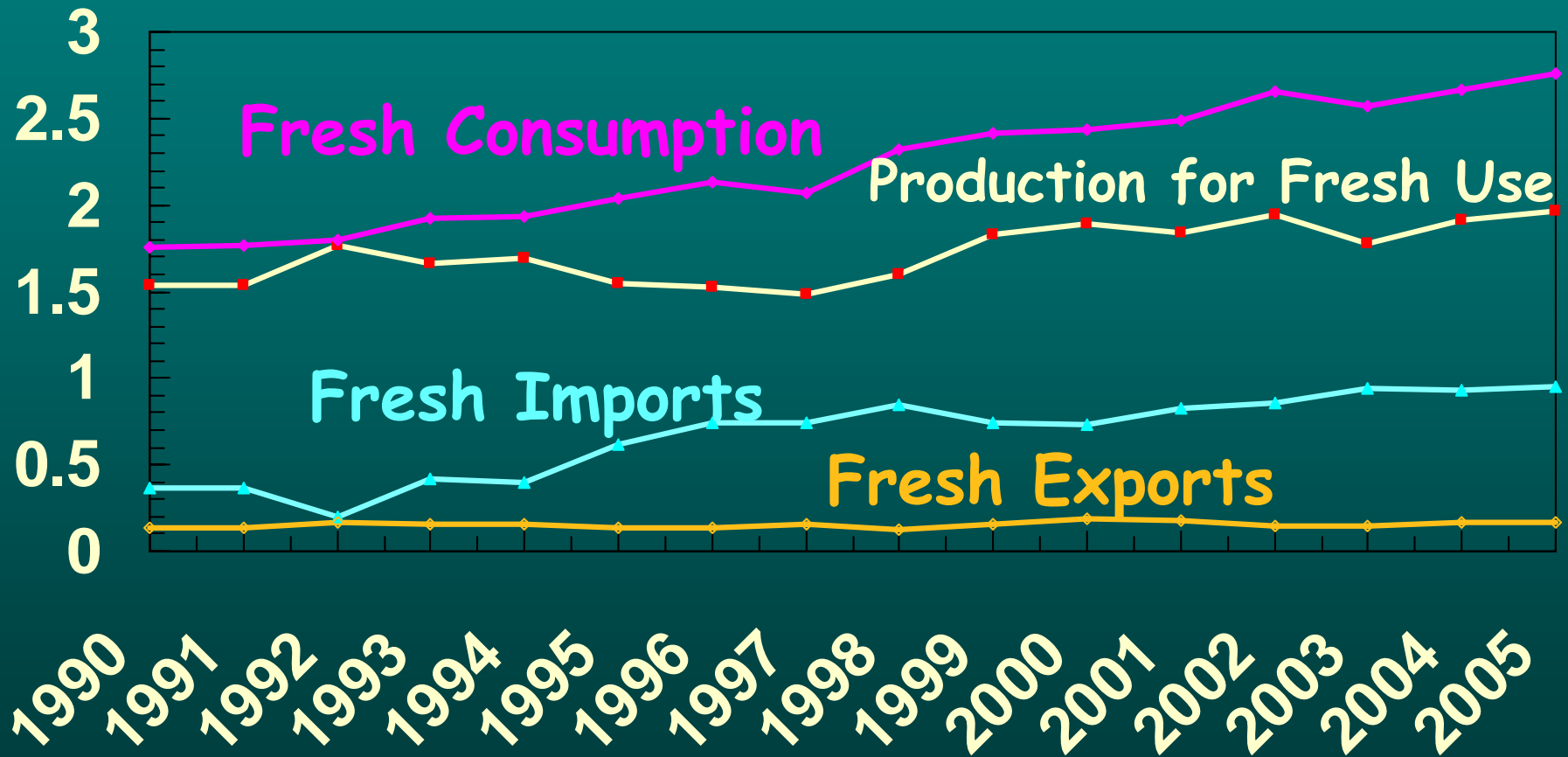
US Average Annual FOB Greenhouse Tomato Prices, 1990-2005, Dollars per Pound



Sources: Greenhouse shippers' internal records

The U.S. fresh tomato market, U.S. GH production included as of 1998*

Million Metric Tons



*Excludes domestic production of grape and cherry tomatoes. Imported grape, cherry and GH tomatoes included for all years.

Sources: Compiled by Cook and Calvin from USDA and DOC sources and Cook and Calvin's U.S. greenhouse tomato production estimates through 2003, updated for 2004 and 2005 by Cook in June 2006.

National Fresh Tomato Retail Shares of Quantity and Value by Tomato Type, 2005 vs. 1999

Type	Share of \$Value		Share of Pounds	
	2005	1999	2005	1999
Greenhouse	43%	42%	41%	31%
Round field	21	36	23	43
Roma (field)	13	16	19	23
Cherry/grape (field)	23	6	17	3

Sources: CTC, IRI, and The Perishables Group

*May not sum to 100 due to rounding and retailer assigned codes.

*North American Fresh Tomato Industry,
Greenhouse¹ and Field, 2004, Excludes Processing*
revised

USA CANADA MEXICO TOTAL

GH Prodn 1,000 Mt	167.896	216.862	179.000	563.758
Field Prodn 1,000 Mt	1,739.3	26.882²	1,967.8	3,734.0
GH Share of Prodn	9%	89%	8%	13%
Average Yield MT/HA	480	487	170	379³

Source: Roberta Cook and Linda Calvin

¹ US GH is estimated, Mexican GH is a preliminary estimate
² 2003; ³Simple average, 306 if weighted average.

**North American Fresh Tomato Field (F) and Greenhouse (GH)
Industry, 2004, Harvested Area, in Hectares, and Production, in
Metric Tons (US and Mexican GH figures are preliminary
estimates)**

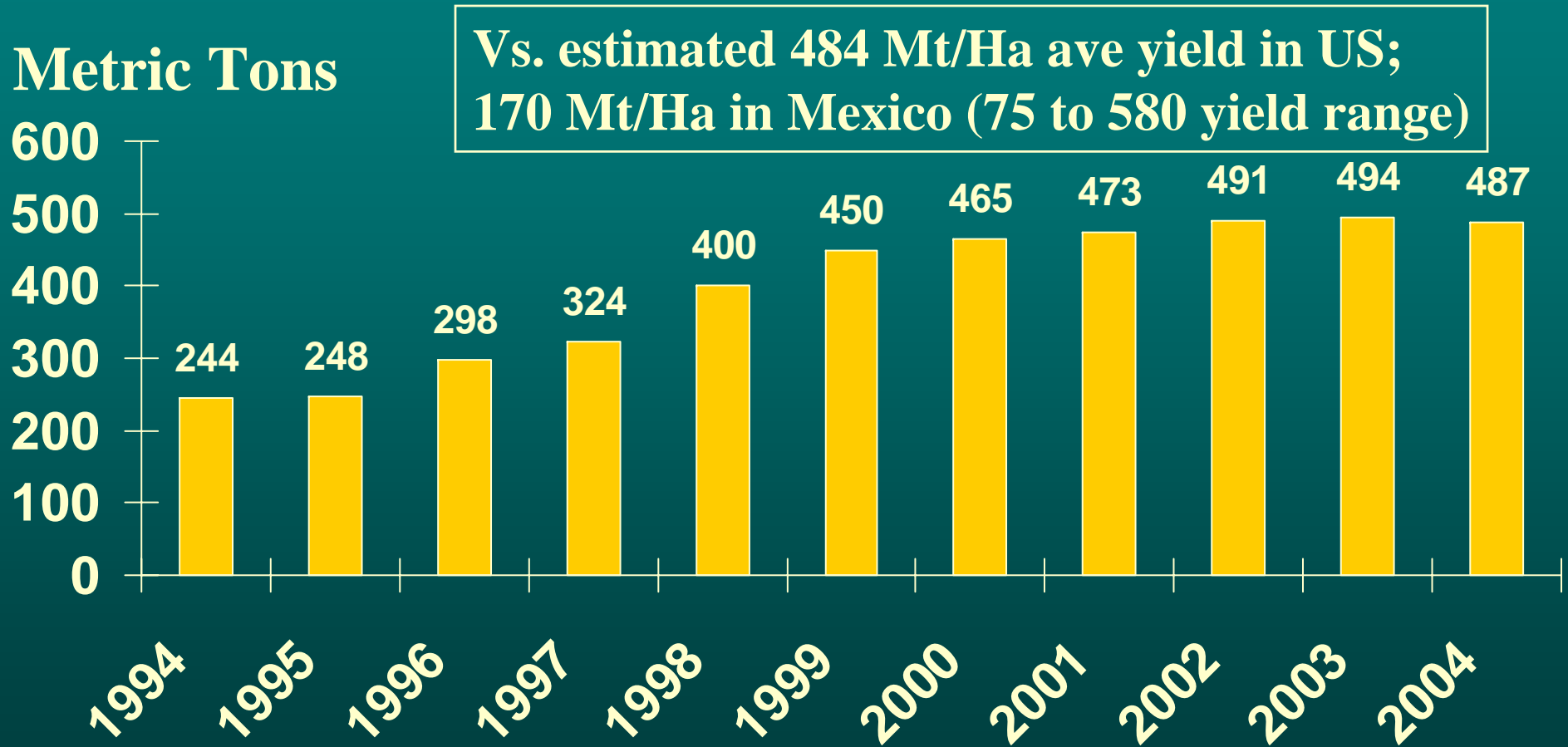
Area	Production	Imports	Exports
USA			
53,050 ^F Plus 350 GH ^E	1,739,340 ^F Plus 167,896 GH ^E	931,771	166,695
Mexico			
67,240 ^F Plus 1050 GH ^E Excludes shade house	1,967,800 ^F Plus 179,000 GH ^E	28,000	825,641
Canada			
445 GH Plus 1813 Field	216,862 GH Plus 26,882 Field	174,183	134,454

^EEstimated

Note: Canadian fresh field tomato data are for 2003. Mexican GH estimates are very preliminary.
Sources: Roberta Cook and Linda Calvin compiled from USDA; US DOC; AMPHI; Stat Canada, industry sources

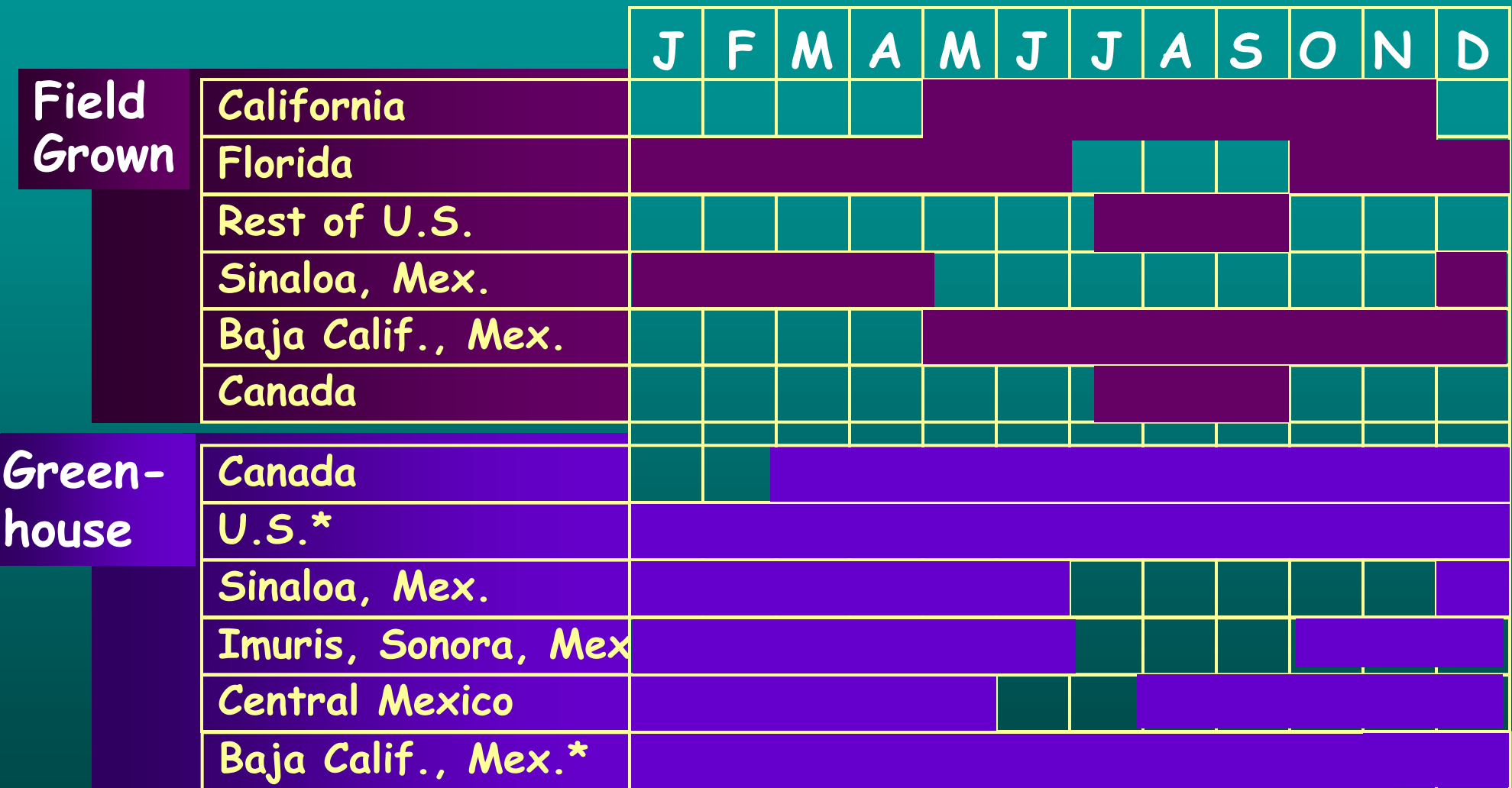
Canadian Greenhouse Tomato Yields

Metric Tons Per Hectare, 1994-2004 (Canada also underwent a learning curve)



Sources: Compiled by Cook and Calvin from Stat Canada and industry sources for BC, Ontario, US and Mexico

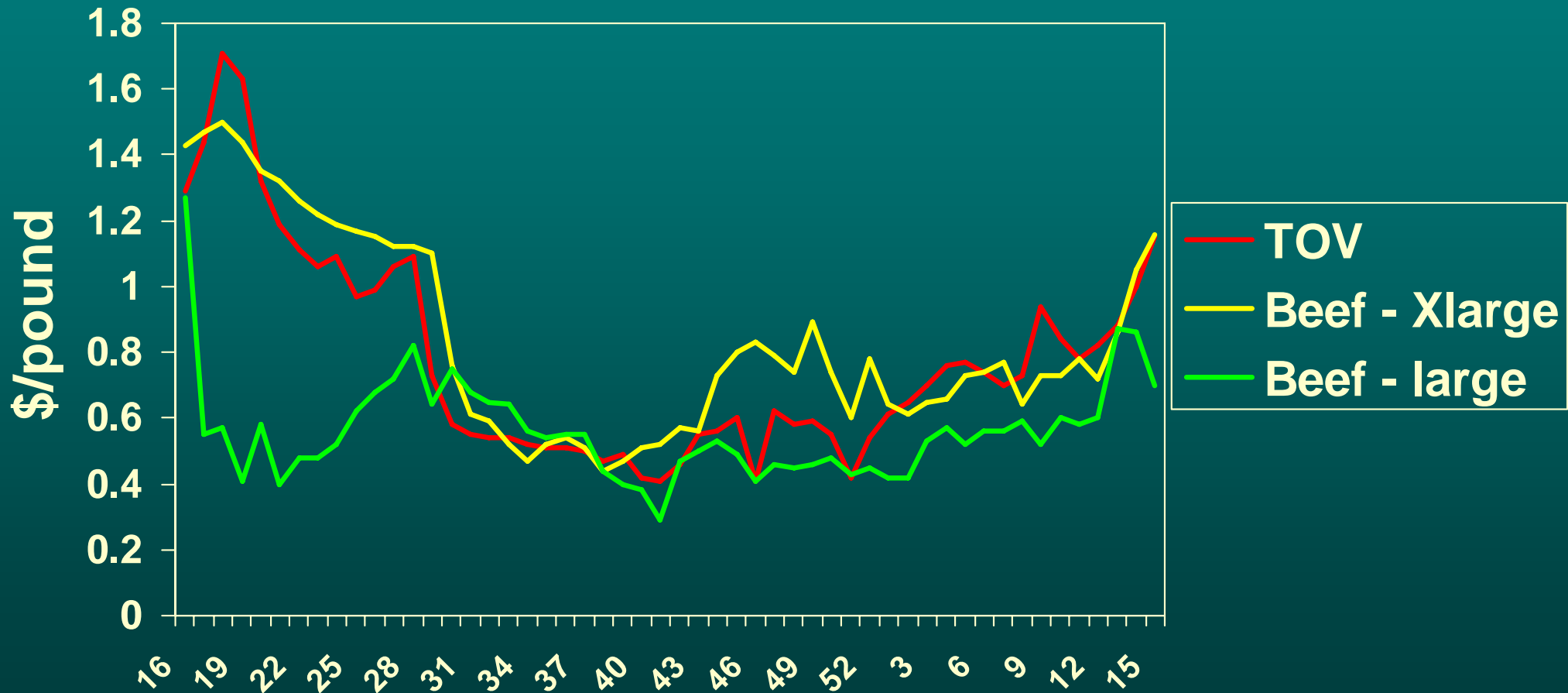
North American fresh tomato shipping seasons (dark bars) by region - greenhouse versus field grown



- Many U.S. and Baja greenhouse industry locations don't produce year-round, but there is year-round production in the aggregate.

Marked Seasonal Pricing Patterns

Weekly Greenhouse Tomato Prices: Week 16, 2005 (April 18) – Week 15, 2006 (April 10), Includes Domestic and Imports, Excludes Seconds*



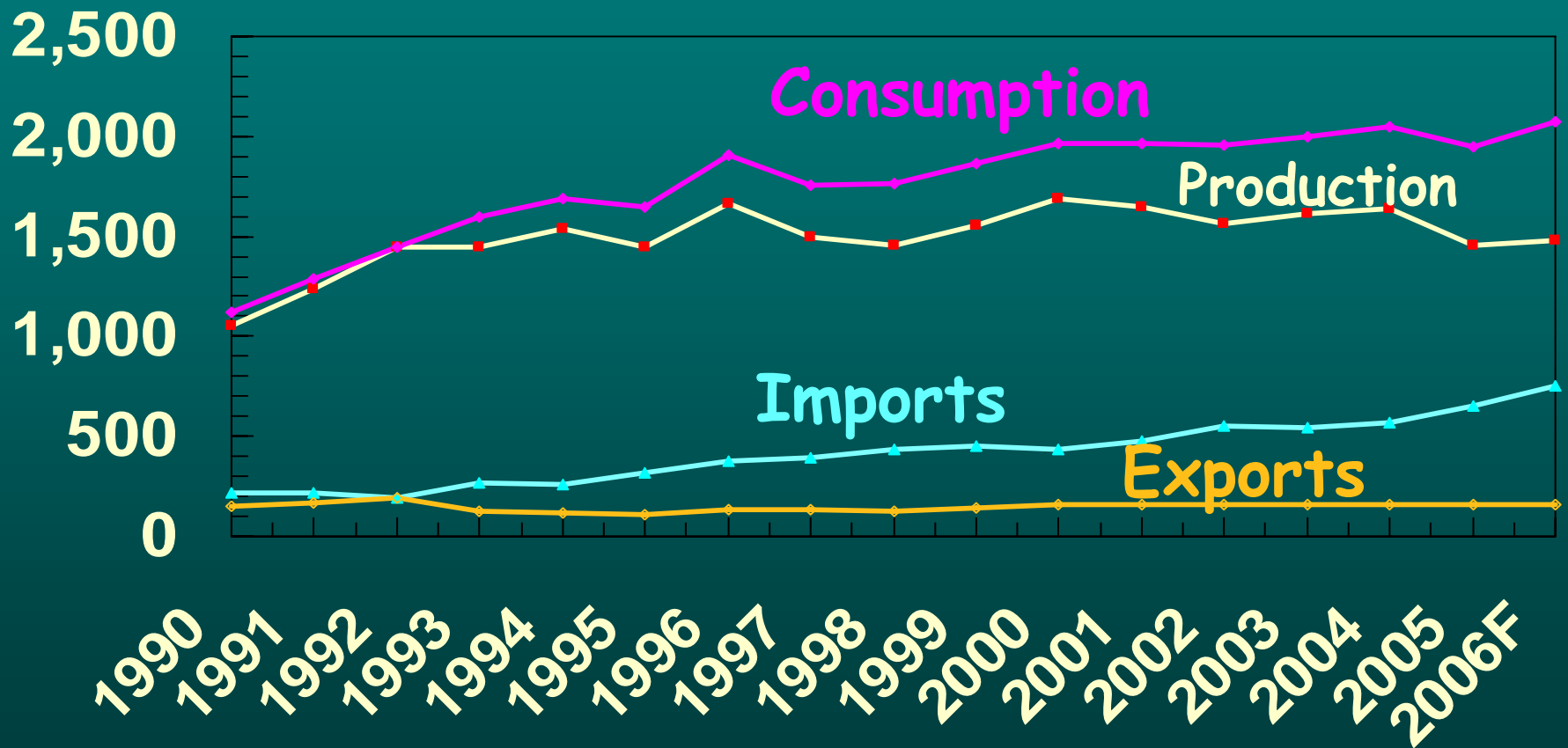
Sources: Greenhouse shippers internal records

US Cucumber and Bell Pepper Farm Value and Imports 2005

	Area Harvested, HA	Production, MT	Farm Value million	Import Value million
Bell pepper	65,370	658,110	\$482.960	\$450.777
Cucumber	23,140	464,110	\$234,516	\$319.164
Bell pepper GH import share, Canada and Holland				37%
Cucumber GH import share, Canada and Holland				20%

The U.S. fresh bell pepper market

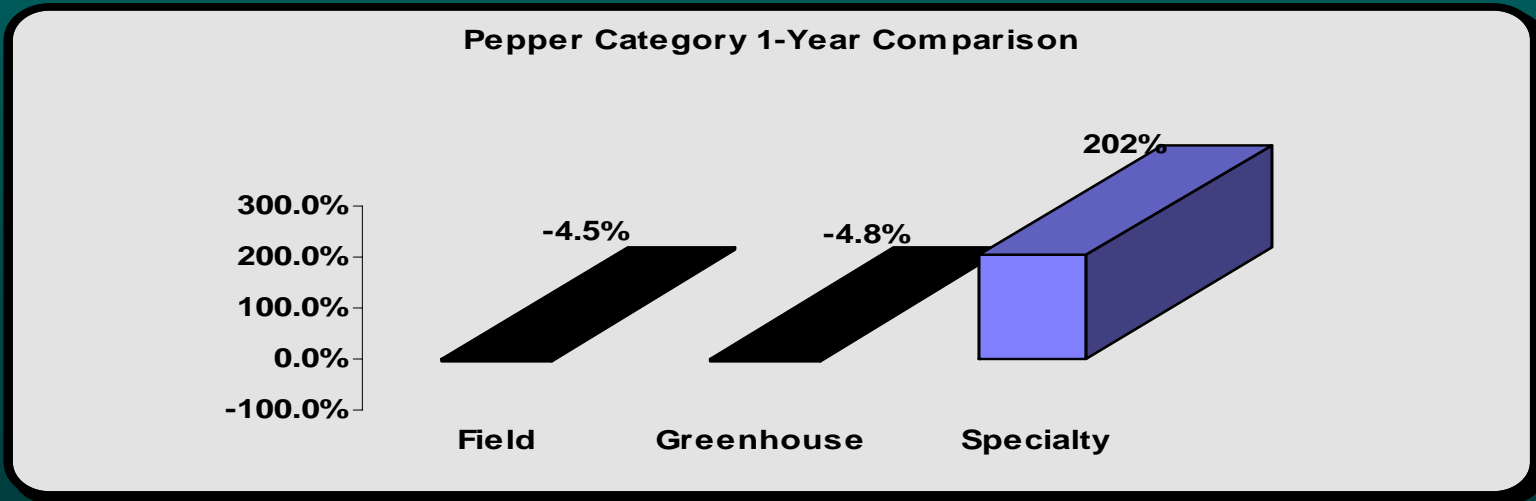
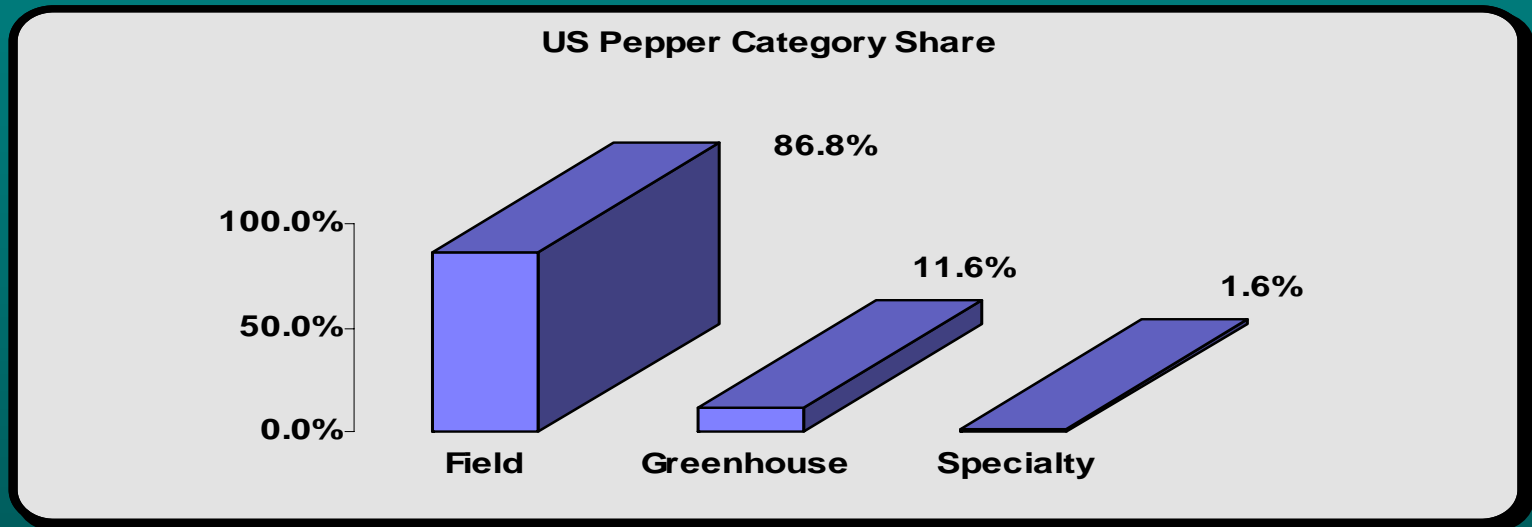
Million Pounds



*Excludes domestic production of greenhouse bell peppers but imported greenhouse peppers are included.

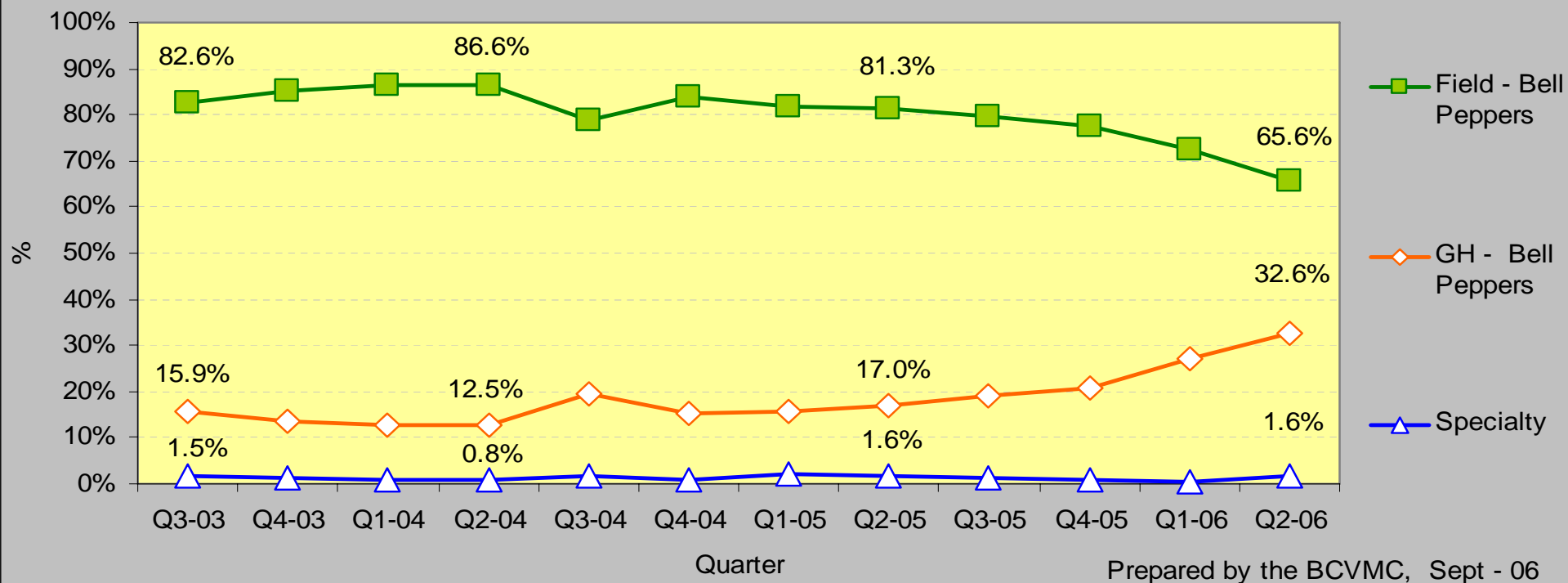
Source: USDA/ERS, Vegetable and Specialties Situation and Outlook Yearbook, July 2006

2002 US Retail Bell Pepper Category – and Rapid Change Since Then



USA Pepper Retail Sales

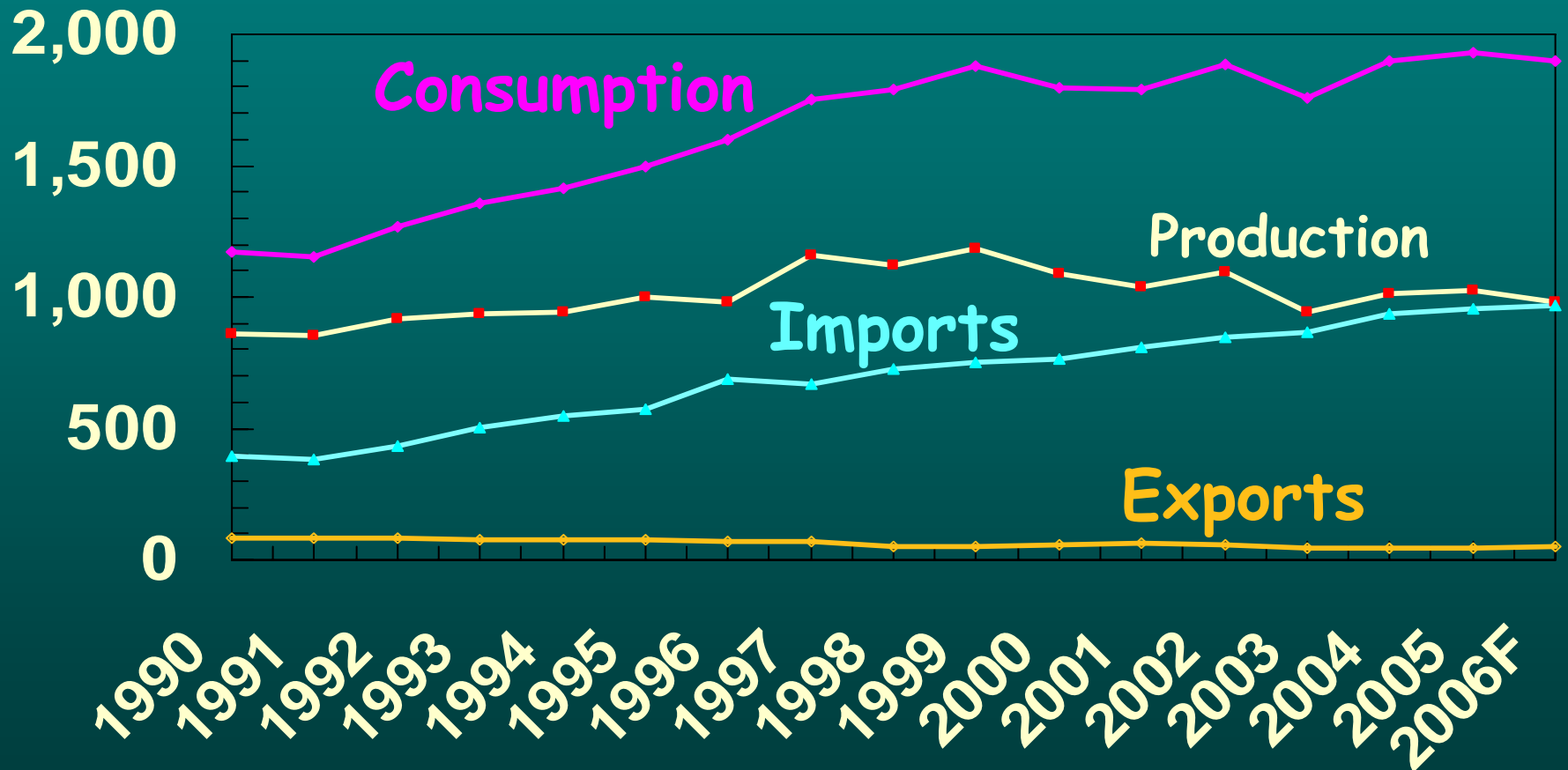
Peppers - USA Retail Sales
52Wk Trailing Quarterly Market Share



■ Greenhouse Bell Peppers has grown to 33% market share for 2006Y/E June-06.

The U.S. fresh cucumber market

Million Pounds

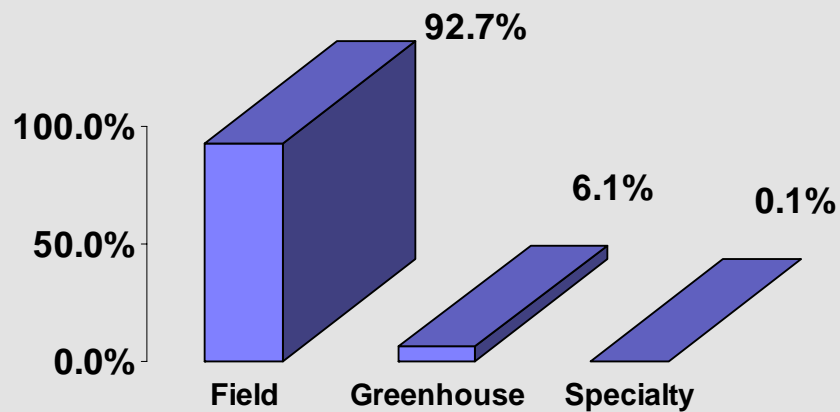


*Excludes domestic production of greenhouse cucumbers but imported greenhouse cucumbers are included.

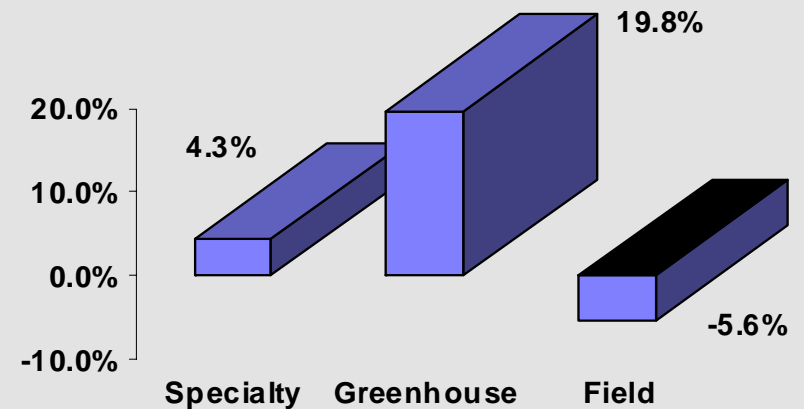
Source: USDA/ERS, Vegetable and Specialties Situation and Outlook Yearbook, July 2006

2002 US Retail Cucumber Category – and Still Growing Since Then

Cucumber Category Share 2002-2003

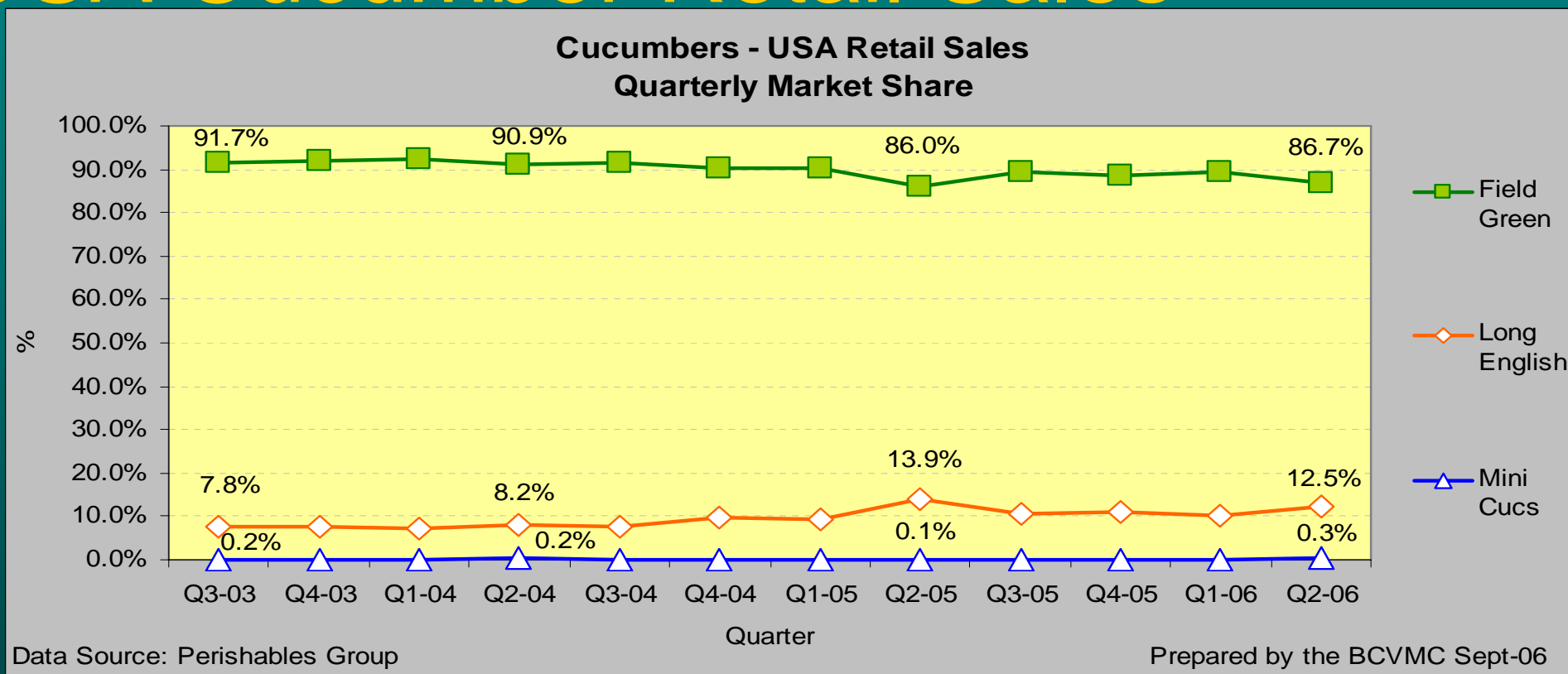


Cucumber Category 1-Year Change



Source: Perishables Group

USA Cucumber Retail Sales

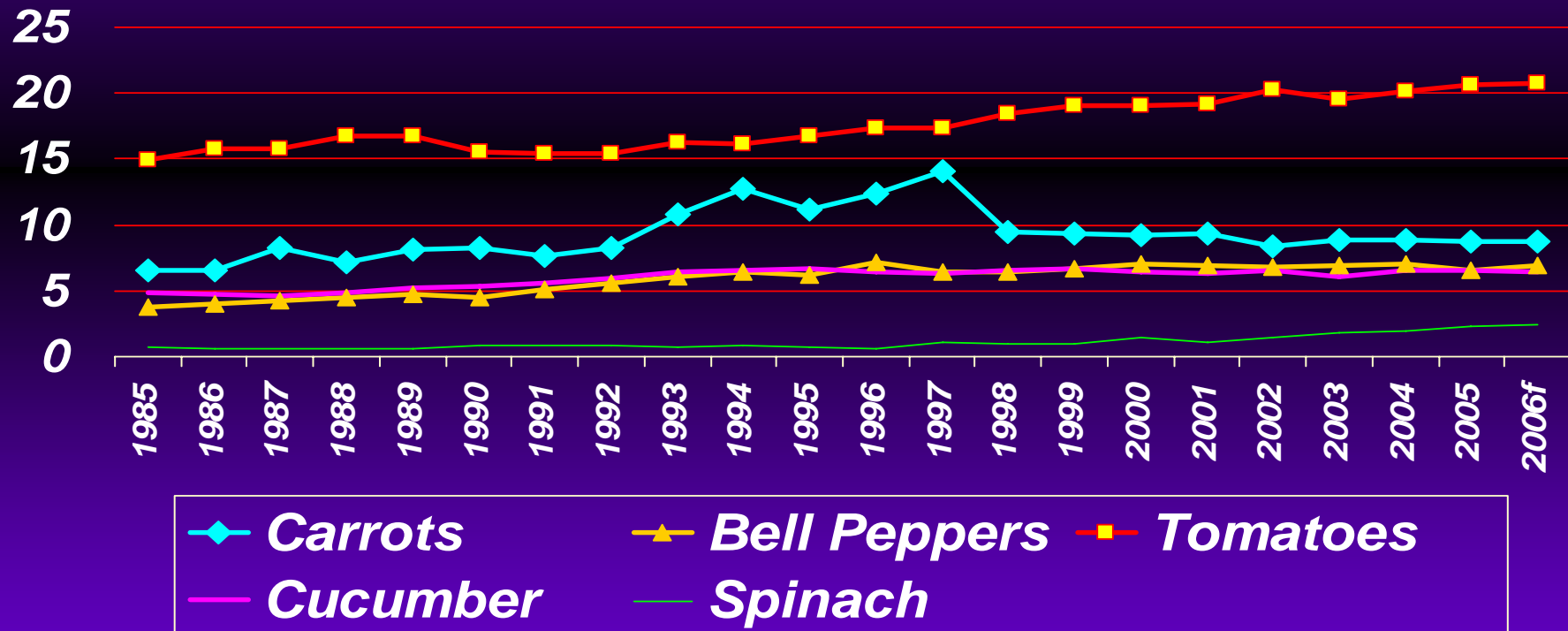


- For Y/E Q2-06, market share for L.E. Cukes fell to 12.5%. This represents a 1.4% decrease compared to Y/E Q2-05
- Part of this decrease in L.E. market share is due to an increase in the market share of Mini Cukes and the Other Category that includes other specialty products and retailer assigned volume

Source: The Perishables Group, as provided by BCHH

U.S. Per Capita Consumption of Selected Fresh Vegetables, 1985-2006^f

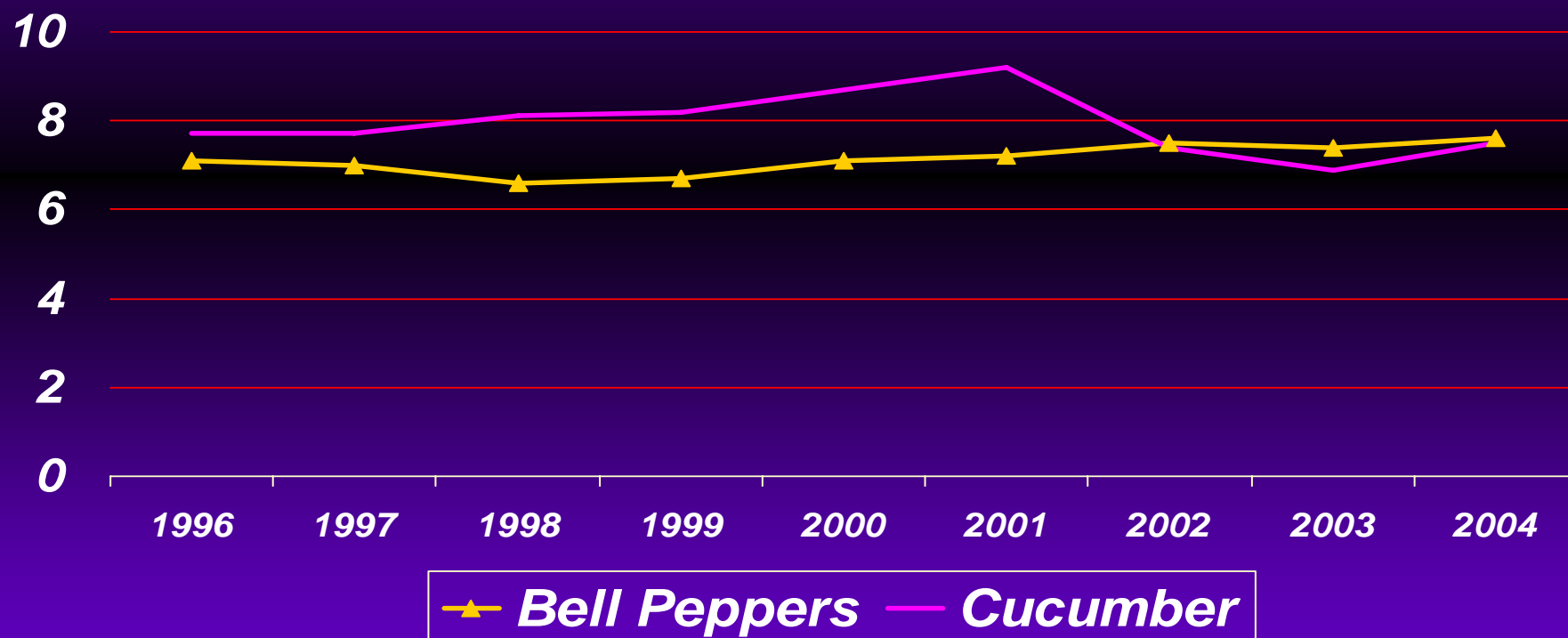
Pounds per capita



Source: USDA/ERS, July 2006 Vegetable Yearbook f=forecast

Canadian Per Capita Consumption of Bell Peppers and Cucumbers, 1996-2004

Pounds per capita



Source: BC Vegetable Marketing Commission

Mexican Protected Culture Industry

- ***Multiple types of greenhouse producers in Mexico, dual field and GH growers vs. dedicated GH growers – these sectors are different!***
- There are multiple technology levels, lower to medium-tech options make sense in coastal areas for dual producers (shade house and passive greenhouses since heat limits the shipping season and hence the ROI on high tech GH's)
- Remember that even lower tech protected culture is much higher tech, higher yielding – and higher cost – than open field production
- Export field/dual tomato growers in Mexico are in a different category than dedicated GH growers since they will continue to export tomatoes whether grown in the open field or protected – this makes the economics of their operations different than for dedicated high tech GH operators

Mexican Protected Culture Industry

- Mexican field exporters (Sinaloa and Baja) are converting more area to protected culture to achieve multiple benefits (higher yields, packout rates and quality; better disease control; lower labor use per kg produced; lower food safety risk; more/better volume/quality when weather impacts field production and prices rise, etc.)
- Some field growers with greenhouses are moving part of their operations to the right locations for greenhouses – vs. where they have always produced
- ***In Mexico firms are still searching for the right locations for high tech GH's, there are established successful firms but also many failures***

Mexican Protected Culture Industry

- European and Israeli equipment suppliers pushing the industry in Mexico, with subsidies from their govts. – much of the growth is not market-driven
- Energy costs an issue for high tech growers since natural gas supplies often unavailable
- US commercial buyer perception is that Mexican greenhouse produce should cost less and the quality is less consistent and sometimes inferior, so in general, Mexican greenhouse growers receive lower prices
- The GH market is a quality market, emerging Mexican producers must understand this
- Marketing alliances to achieve year-round supply

Economics of GH vs FG Fresh Tomato Production

- *Investment* costs of around \$600,000 to over \$1 million/Ha for high-tech GHs, plus variable production costs
- Vs FG pre-harvest costs, including overhead and capital costs, from around \$3100/Ha in the CA Central Valley (UCD 2000 crop budget) to \$12,500 to 16,000/Ha. in Fla., depending on the region and season (U of Florida 02/03 crop budgets)
- Ave. Canadian and US GH yields approach 500 Mt/Ha. (vs US national ave. FG yields of 32 Mt)
- Yes, GH can generate huge yields, but given the high costs they still generally need a price premium to be viable, only the most efficient GH producers can survive at field-equivalent FOB's

Economics of GH vs FG Fresh Tomato Production

- Clearly, with this kind of variation in yields and costs it will take some time to see how the industries shake out in all three countries.
- In the end, PER UNIT COSTS (costs per pound or kg) relative to per unit prices are what matter – plus quality and consistency, of course!
- Mexico is exploring low and medium tech as well as high tech options to achieve the best ROI; yields are increasing in all technology levels as management and technical knowledge improve
- Canada had an exchange rate advantage but this diminished, expansion has recently stopped and energy costs are a factor

Challenges for the N. American greenhouse industry

- Increased NAFTA production and lower prices
 - *recently growth in the US after a period of stability, not just in Mexico*
 - Eurofresh has been on an aggressive expansion track
 - also new (and unproven) entrants to the US industry, often backed by venture capital, and in the “wrong” locations – 24 acre Maine example
- Competition for the US industry during the winter from Mexico
 - Some is low-tech and low-cost with variable quality
- Canada is not expanding and seems to be reducing early and late season production due to economics, but competition during the summer from Canada still a major force
- Alliances that exploit relative strengths, marketing and promotion are critical!

The emergence of Greenhouse (GH) Tomatoes Changes the Dynamics of the N. American Tomato Industry

- But remember, that's only about half the picture
- Field-grown mature green tomatoes still own foodservice channels, estimated at at least half of tomato usage, and foodservice is growing more than retail
- This is why the field tomato industry has not declined in the face of GH expansion
- Plus, the field tomato industry has a new product - grape tomatoes – partly a competitive response to GH

The emergence of Greenhouse (GH) Tomatoes Changes the Dynamics of the N. American Tomato Industry

- **Remember, Mexico's main advantage continues to be winter production, same as for the field industry**
- **Given the investments that are being made in greenhouses, particularly in Mexico, it is important to recognize that average price levels are likely to come down as GH production continues to expand**
- **Higher competition and lower average prices means that only the most efficient are likely to survive**
- **The learning curve for new GH producers is getting shorter, they must achieve high quality and low per unit costs sooner rather than later**

The Emergence of Greenhouse (GH) Tomatoes Changes the Dynamics of the N. American Tomato Industry

- As prices for GH tomatoes decline it is more difficult to get retailers to carry field-grown round tomatoes
- However, other field grown tomatoes like grape tomatoes have been growing, in both retail and foodservice channels, romas too (McDonald's salads with grape tomatoes, Subway, fast casual restaurants, etc.)
- The GH industry largely doesn't serve foodservice – yet this is the most rapidly growing market

The Emergence of Greenhouse Tomatoes Changes the Dynamics of the N. American Tomato Industry

- N. America is different than Europe (which is dominated by protected culture) since here we can produce outside year-round (Florida and Sinaloa in the winter)
- For dedicated high tech GH production to overtake the field industry there must be a technological breakthrough that brings production costs (per pound) closer to field levels
- Mexico not necessarily lower cost than Canada and the US; GH is capital- and technology-intensive and Mexico is at a disadvantage in this regard – Mexico's advantage is still winter production

The Emergence of Greenhouse Vegetables Changes the Future Dynamics of the N. American Fresh Vegetable Industry

- **Canada's advantage in technology and quality is increasingly challenged by energy costs and its inability to produce (economically) in the winter – it produces when prices are lowest**
- **The US industry, based in the Southwest, has the advantage of year-round production, high technology and quality**
- **GH will continue to grow in North America, but the share of total production by location is likely to change over the next decade**
- **Product innovation is a necessity**
- **There is a lot of room for growth in other protected culture produce, not only in cucumbers and peppers (e.g., lettuce, berries)**