

# Food Science Perspectives of HFCS

School Nutrition Association 62<sup>nd</sup> Annual Conference

*High-Fructose Corn Syrup:  
A Science Based Discussion*

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# HFCS in perspective

## Surprising attention

- Dietary component for eons
- Similar to sucrose
- Expert reviews: no concerns

## Predictable

- Obesity solution sought
- Historical precedent
- Distrust of government/agriculture/industry



*Discovery of honey* ~ Piero de Cosimo  
1462, Worcester Art Museum

# *I hope to convince you...*

- HFCS is similar to sugars from natural sources
- HFCS is similar to other caloric sweeteners
- HFCS is a highly functional and valued ingredient
- HFCS use equals sucrose in the US; it's a sucrose world
- Perspective is lacking in the HFCS debate

# What is HFCS?

**HFCS** = monosaccharides = free sugars  
Fructose + glucose

**Sucrose** = disaccharide = bound sugars  
Fructose–Glucose

# HFCS is similar to sugars from natural sources

Fructose (% total sugars)	Fruit, vegetables, nuts, dairy
≥66	Apples, pears
56-65	Asparagus, raspberries, spinach, watermelon
42-55	Almonds, apricots, bananas, blackberries, blueberries, broccoli, Brussels sprouts, cabbage, cantaloupe, carrots, cashews, cherries, Clementines, sweet corn, cucumbers, currants, dates, figs, filberts, grapefruit, grapes, hazelnuts, honeydew, melon, kiwi fruit, lentils, lettuce, lime juice, macadamias, nectarines, sweet onions, navel oranges, peaches, peanuts, peas pecans, sweet peppers, persimmons, pineapple, pistachios, raisins, summer squash, strawberries, sweet potatoes, tomatoes, walnuts, cooked wild rice
31-41	Artichokes, celery, okra, plums, radishes, turnip greens

Source: NutritionData.com. Conde Nast. 2008.

# HFCS is similar to other caloric sweeteners

Sweetener	Physical form	% Total sugars	
		Total fructose	Total glucose
Crystalline fructose	Dry	99.5+	0.1 max
HFCS-42	Syrup	42	58
HFCS-55	Syrup	55	45
Honey	Syrup	48	52
Crystalline sucrose	Dry	50	50
Medium invert	Syrup	50	50
Total invert	Syrup	50	50
Grape juice+ conc.	Syrup	53	47
Apple juice+ conc.	Syrup	65	35
Pear juice+ conc.	Syrup	74	26
Agave nectar+	Syrup	74	24

# HFCS is similar to other caloric sweeteners

- Composition
- Sugars ratio
- Production unit operations
- Functionality (some differences)
- Absorption
- Metabolism

# Fructose-glucose sweeteners are interchangeable

Once absorbed into the bloodstream, they

- deliver the *same* sugars
- at the *same* ratios
- to the *same* tissues
- within the *same* timeframe
- to the *same* metabolic pathways

# HFCS/fructose is highly functional

- Stability in acid
- Ease of handling
- Flavor enhancement
- Control of freezing
- Fermentable sugars
- Moisture retention
- Resistance to crystallization
- Sugars for browning reactions
- Sweetness equivalent to sucrose

# *Sweetness*

## sucrose = HFCS-55

Sugars	Sweetness Intensity (crystalline) <sup>1</sup>
Fructose	180
Sucrose	100
HFCS-55	
Glucose	74-82

<sup>1</sup>Schallenberger & Acree. 1971. Sugar Chemistry. AVI Pub. Co., Westport CT.

<sup>2</sup>White & Parke. 1989. Cereal Foods World. 34(5):392-398.

# *Sweetness*

## sucrose = HFCS-55

Sugars	Sweetness Intensity (crystalline) <sup>1</sup>	Relative Sweetness (10% ds) <sup>2</sup>
Fructose	180	117
Sucrose	100	100
HFCS-55		99
Glucose	74-82	65

<sup>1</sup>Schallenberger & Acree. 1971. Sugar Chemistry. AVI Pub. Co., Westport CT.

<sup>2</sup>White & Parke. 1989. Cereal Foods World. 34(5):392-398.

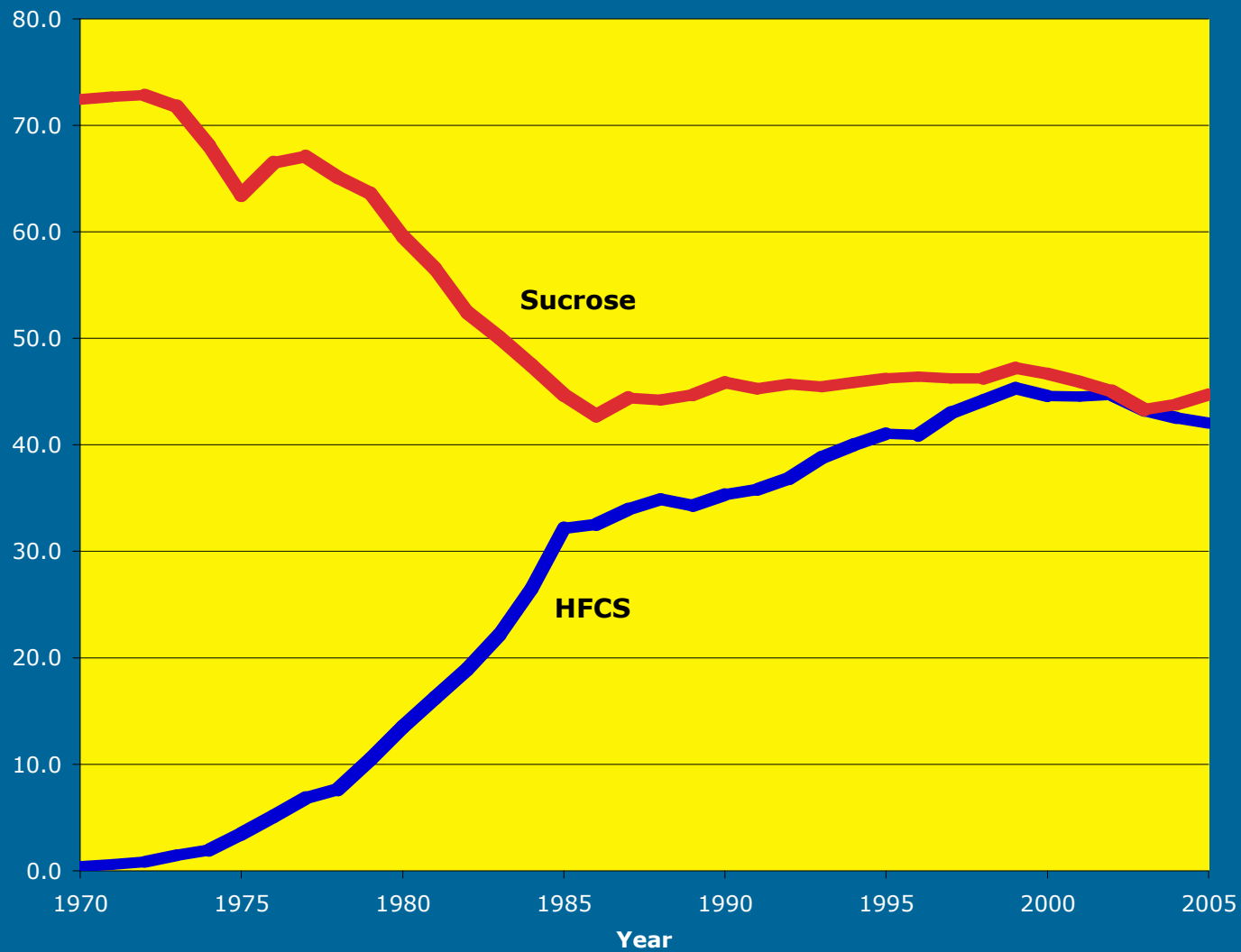
# HFCS is a versatile ingredient

- Carbonated soft drinks, juices, fruit drinks
- Cereals, breakfast drinks
- Condiments
- Dairy products
- Meats
- Sauces, dressings, marinades
- Snack foods
- Syrups, toppings

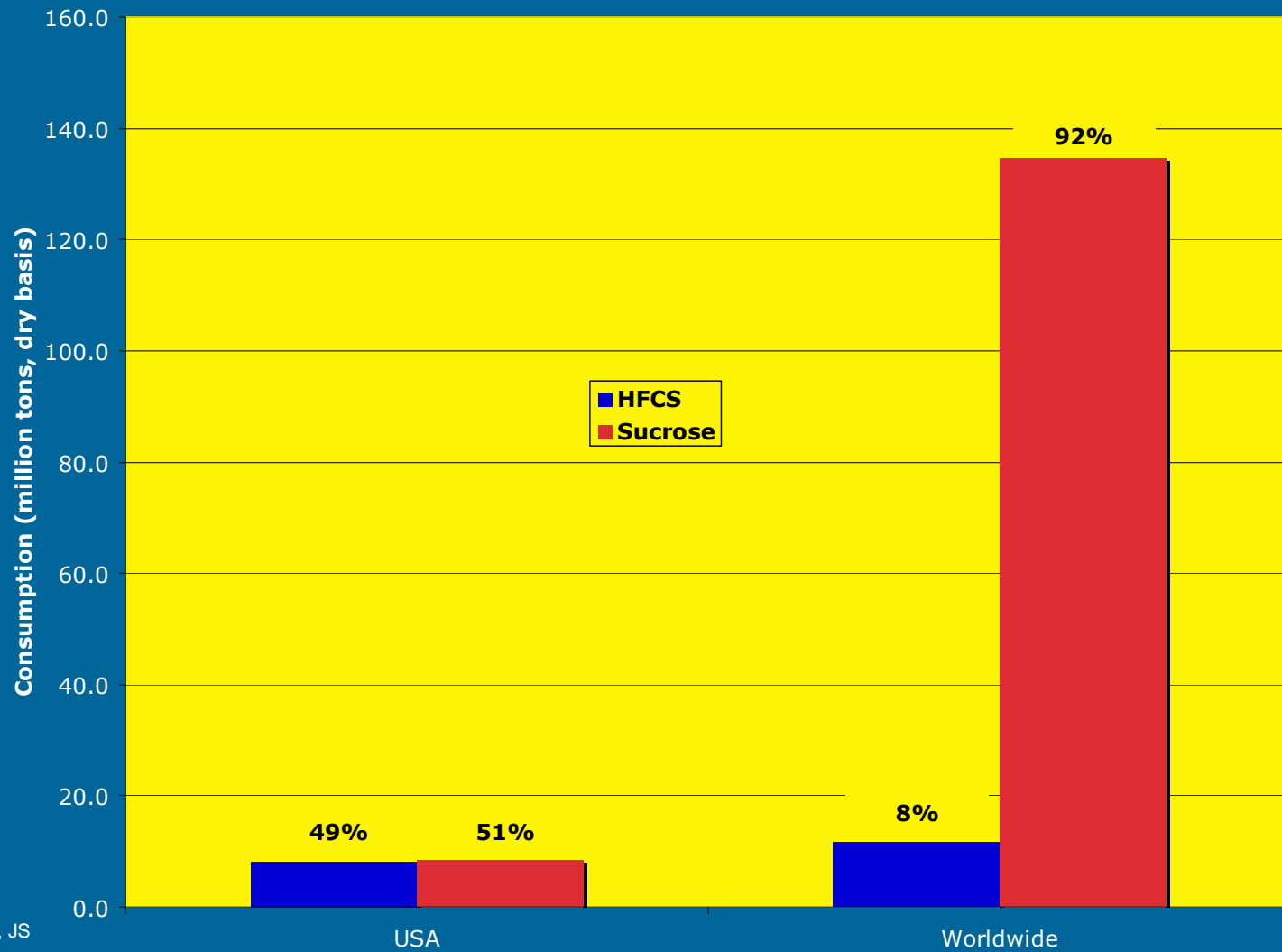
# Perspective is lacking in the HFCS debate

- As HFCS ↑, sucrose ↓
- We eat more of everything now than 35y ago
- HFCS = sucrose in lab tests
- HFCS is not uniquely responsible for obesity in the US or abroad
- Replacing HFCS with sucrose will not reduce obesity or improve health; they are the same

# *US availability: sucrose = HFCS*



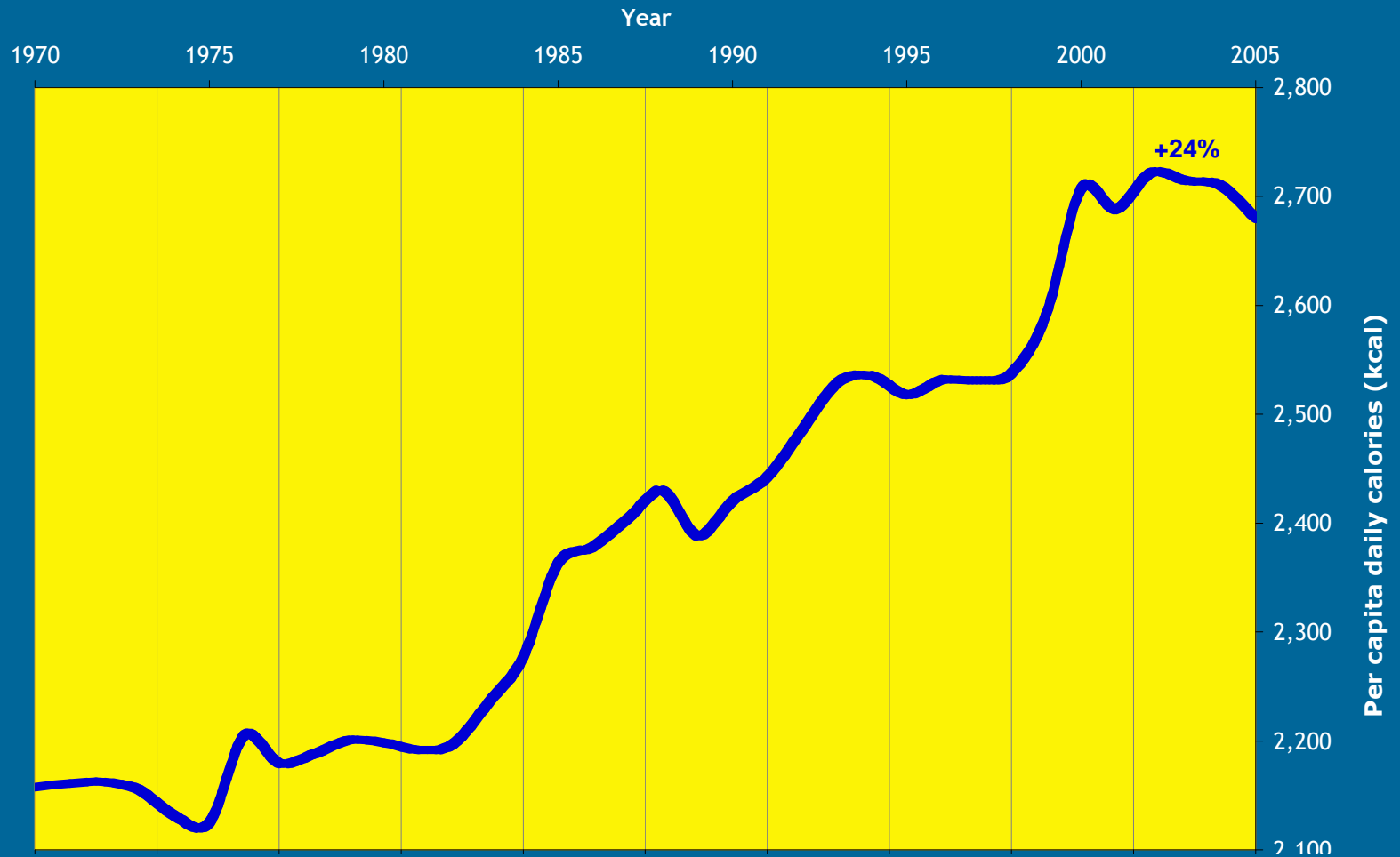
# It's a *sucrose* world



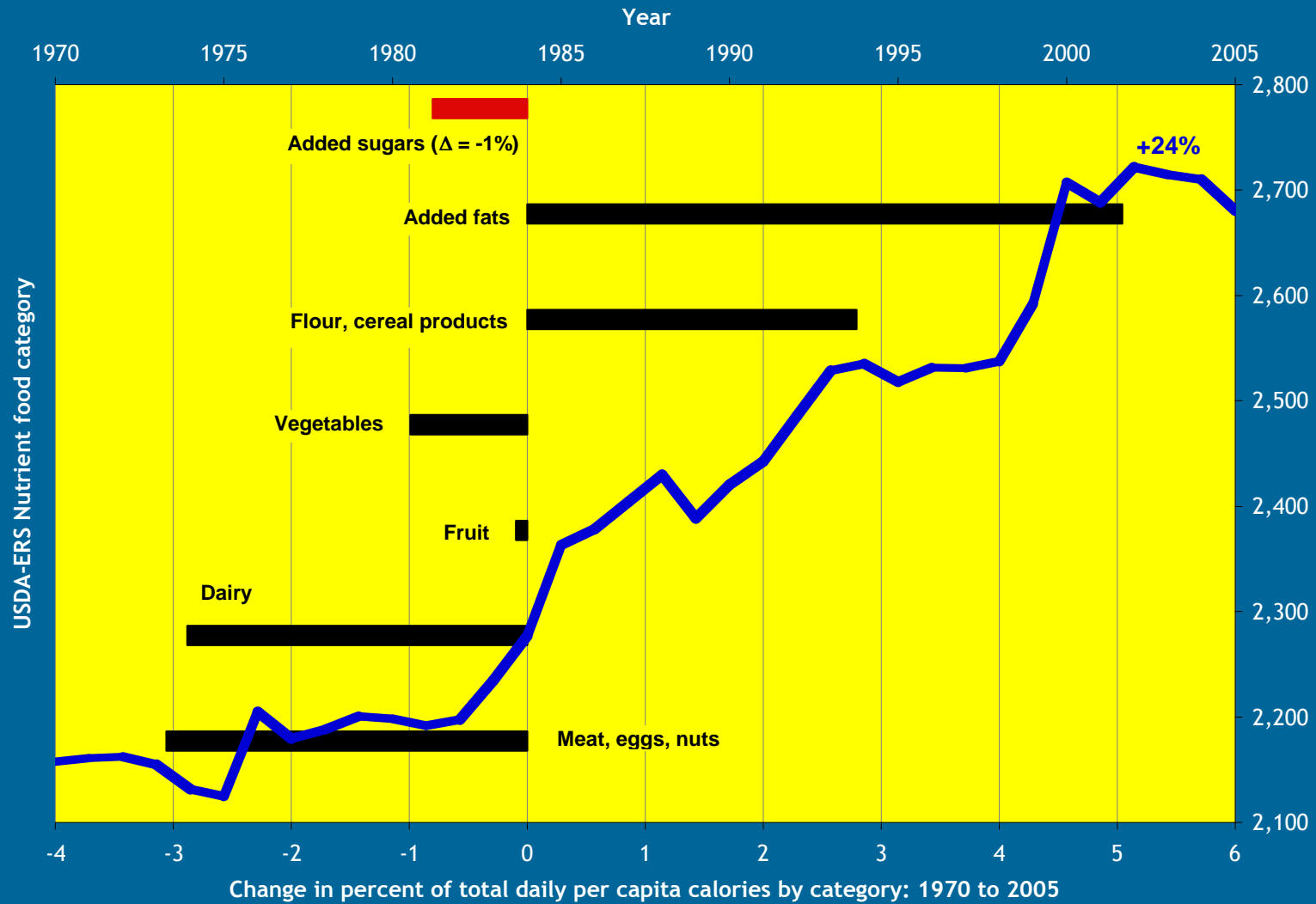
White, JS

Source: Fereday et al. Sweetener analysis. LMC International Ltd., 2005.

# Calorie intake up 24% since 1970



# We eat more of *everything*



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