Technological Experiences and Advances in the Beverage Sector

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Leveraging Food Technology for Obesity Prevention and Reduction Efforts

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The Beverage Industry

q **Products Trends**
   Industry portfolio shift to more reduced, low- and no-calorie offerings

q **Technology**
   Low- and no-calorie sweeteners and flavors are primary technology enablers for calorie reduction in beverages

q **Successes and Challenges**
U.S. Liquid Refreshment Beverage Market
Calories Per Ounce Produced

Liquid Refreshment Beverage Category

Calories per Ounce

21% calories per oz
1998-2008

M. Storey, Physiology & Behavior, 2010
U.S. Liquid Refreshment Beverage Market Share Of Volume By Segment Produced

M. Storey, American Beverage Association, personal communication, 2010
Leveraging Food Technology for Calorie Management in Beverages

Industry Successes & Challenges in Leveraging Food Technology

**Targets**
- CALORIE REDUCTION
  - Nutrient Density

**Challenges**
- TASTE (Flavor)
  - Cost
  - Stability
  - Solubility
  - Availability/Supply Chain
  - Regulatory Approval
Calorie Reduction / Nutrient Density

**Caloric Sweeteners**

- **Sweetening with isolated refined sugars**
  - Sucrose
  - HFCS
  - Glucose
  - Fructose
  - Maltose
  - Others

- **Sweetening with Fruit**
  - Apple
  - Grape
  - Pear
  - LoHanGuo Monk Fruit Concentrate
  - Others

- **Sweetening with Other Plants**
  - Honey
  - Agave
  - Grain Syrups (e.g. rice, oat)
  - Others

Others
Leveraging Low / No Calorie Sweeteners

New Technology Advances

Low- and No-Calorie Sweeteners

New and “Natural”
- Reb A (97%)
- Stevia Leaf Extract with 7-9 Sweeteners
- LoHan Guo Extract (Mogroside V) (Monatin)?
- (Brazzein)?
- Others

Established
- Aspartame
- Acesulfame K
- Saccharin
- Sucralose
- Others
Case Study - Stevia Extract Zero Calorie Sweetener Development

The Coca-Cola Company (TCCC) and Cargill partnership

**TRUVIA™**
- Zero-calorie sweetener extracted from the natural stevia leaf
- ~200 times as sweet as sucrose

- In 2008, Rebiana, the sweetener in Truvia, was established to be safe
  - JECFA review concluded Rebiana to be safe
  - GRAS status was achieved under FDA regulations

**Sprite Green**
- 50 calories/8 fl. oz.

**VitaminWaterZero**
- 0 calories/8 fl. oz.

**Odwalla Quencher**
- 50 calories/8 fl. oz.
Data Requirements for New Ingredient Safety Assessments (GRAS)

- Identity of the ingredient
- Conditions of proposed use
- Intended technical effect
- Manufacturing methods
- Estimated Daily Intake (EDI)
- Acceptable Daily Intake (ADI)
- Safety studies

Joint TCCC and Cargill Partnership to Develop Stevia Extract

- Resulted in 12 peer-reviewed scientific publications
- Generally Recognized As Safe (GRAS) status
Challenge – Sweetener Taste Profile

Temporal Response

Sweetener Flavor Profile Characteristics
Calorie Reduction

Mix & match of various building blocks enables “taste synergy” at the required cost level.

- Sweetness Systems
  - Caloric Sweeteners
  - New “Natural” Low/No Cal Sweeteners
  - Established Low / No Cal Sweeteners

- Color System
- Acidity System
- Flavor System

Optimize sugar/acid balance
Optimize taste balance
Enhance sweetness

Calorie Reduced Beverage
Taste and Calorie Reduction are Key

- Natural Bitterness Inhibitors
- Sweetness Enhancers
- "Sweetness Linger" research
- Alternative Natural, Non-Caloric Sweeteners
- New Sweetener Solutions using Novel Blends

Reduce calories
Reduce calories
Taste Improvement
Taste Improvement
Taste Improvement
Other Beverage Technology Opportunities

• Satiety and Weight Management
  - Subjective assessment of fullness and hunger (short term), and calorie intake (meal or 24 hr)
  - Weight loss and preventing weight gain

• Juice
  - Sugar reduction - regulatory considerations with standards
  - Enhanced nutrient density

• Enhanced nutrient density
  - E.g. vitamin D, DHA – technology and regulatory hurdles
Nutrient Density – Potential New Technology Enablers

- New bioconversion/bio-processing technologies
  - Soluble Fibers
  - Increase level of nutrients

- New separation technologies (e.g. membrane filtration)
  - Removal of undesired compounds

- New emulsifications & new emulsification technologies
  - Improve solubility, stability and bioavailability of targeted components
Successes in Beverage Trends and Technology

• Shifts in beverage calories portfolio
  - Sales of sugar-sweetened sparkling drinks are in decline, while innovations in sweetener technology are enabling growth of the no and low calorie sector
  - From 1998 to 2008, total calories per oz. brought to market by the U.S. beverage industry decreased by 21%
Innovating with Low- and No-Calorie Sweeteners Enable Beverage Portfolio Shift

Beverages are essentially the only foods that can be calorie-free.

Our first zero-calorie soft drink. Sweetened with saccharin

#1 zero-calorie drink in the U.S. Sweetened with aspartame

Most successful product launch since Diet Coke. Sweetened with aspartame and Ace K

1963

1982

2005
Summary - Opportunities and Challenges

• Beverages are essentially the only foods that can be calorie-free.

• Low- and No-calorie sweeteners
  - Taste barriers
  - Regulatory approvals
  - Supply chain
  - Costs
  - Consumer acceptance
  - New technologies require long term development strategies
Thank You