SensoryEffects® Capabilities Overview
The Combination of Balchem and SensoryEffects

- Balchem Corporation completed the acquisition of SensoryEffects on May 7, 2014
- SensoryEffects was a privately held food solutions company, founded in 2006
- Balchem acquired all of the outstanding capital stock of SensoryEffects
- The acquisition of SensoryEffects accelerates Balchem’s (and SensoryEffects’) strategic growth plans into health and wellness markets – human, food and animal nutrition systems
- The expanded team delivering SensoryEffects’ solutions and Balchem’s functional-based offerings, is a powerful combination
GROWTH HISTORY
Balchem Corporation

- Founded in 1967, Balchem is engaged in the development, manufacturing and marketing of specialty performance ingredients and products for the food, nutritional, feed, pharmaceutical and medical sterilization industries.
- NASDAQ: BCPC
- Headquarters: New Hampton, NY
- Manufacturing Sites:
  - Slate Hill, New York
  - Green Pond, South Carolina
  - Verona, Missouri
  - Salt Lake City, Utah
  - St. Gabriel, Louisiana
  - Marano Ticino, Italy
  - Covington, Virginia (new)
  - Bridgeton, MO
  - Defiance, Ohio
  - Reading, PA
  - Marshfield, WI
  - Lincoln, NE
  - Sleepy Eye, MN
- Approximately 800 Employees

“New”
OUR LOCATIONS

SensoryEffects®
Flavor Systems
Bridgeton, MO

SensoryEffects®
Powder Systems
Defiance, OH

SensoryEffects®
Powder Systems
Marshfield, WI

SensoryEffects®
Powder Systems
Reading, PA

SensoryEffects®
Powder Systems
Sleepy Eye, MN

SensoryEffects®
Cereal Systems
Lincoln, NE

Balchem Manufacturing Sites

Balchem Encapsulates®
Microencapsulation
Slate Hill, NY

VitaCholine®
Marano Ticino, Italy

VitaCholine®
Verona, MO
POWDER SYSTEMS

SensoryEffects Powder Systems manufactures and supplies customized spray dried and blended emulsified powders.

Product Technologies

- **Emulsified Powders:**
  - Creamer Systems
  - Dairy Replacers
  - Ingredient Bases
  - Powdered Fats
  - Nutritional Beverage Bases
  - Whipped Topping Bases
  - Infant & Toddler Formulas
  - Malted Milk Powders
  - Milk Crumb Powders

- **Innovations:**
  - Trans-Fat Free
  - Cold Water Soluble
  - Instantization
  - Medical Foods
  - Beverage Bases

**Processing Capabilities**

**Mixing/Blending:**
- Homogenization
- Ribbon Blenders
- Wet Mixing (Various Viscosities)

**Spray Drying:**
- Box Spray Dryer
- Tower Sprayer Dryers

**Pilot Plant:**
- Agglomeration
- HTST Processing
- Retorting

**Certifications:**
- SQF Level II
- HACCP
- Organic/Non GMO
- Kosher Dairy
- NSF Certified
Spray Dried

SensoryEffects combines practical and theoretical knowledge in dairy and non-dairy related fields to help you with your emulsion related questions. Many food products contain oil and water, these phases are immiscible, but can coexist in stable form, in food products via emulsification.
Steam jacketed kettle with 2-stage homogenizer (500/3000 psi) & plate exchanger.

Tower spray dryer (direct burner)- high pressure nozzle feed to dryer producing emulsified powders (20–200 lbs in a day).

Membrane processing of products or additives (RO, NF, UF, and MF).

Retort trials of formulas – evaluation of formulas under sterilization conditions, agitated or still (250°F for 30 minutes), cans (steel vacuum) or aluminum (15 psig).

Agglomeration/Glatt – using water, binders or lecithin (hydro & lipophilic properties).

Dry-Blending – ribbon blender, v-shell blender
LABORATORY


- **Whip & foaming properties of emulsions** - % overrun/weep. Freezing point depression.

- **Turbidity, conductivity, pH measurements** for emulsified products.

- **Analytical (physical & chemical)** - Porosity, PSD, Density, Moisture, & Aw.


- **Accelerated shelf life studies** – Temperature and humidity controlled.

- **Individual dispense testing machines** – 20 different types/models & sealers.
AGGLOMERATION CAPABILITY COMING SOON!

- Solution sprayed to bind particles together, resulting in uniform agglomerates that possess new physical properties.

- Agglomeration provides a powder uniformity while improving product dispersion (instantizing), facilitate precise dosing and reducing dusting.
Composition of Powders

**STANDARD**

- **Fats**
  - Lauric (coconut/PKO)
  - Vegetable (soybean, canola, sunflower, palm, safflower, MCT)

- **Carbohydrates**
  - Corn Syrup
  - Maltodextrin
  - Inulin

- **Primary Emulsifier**
  - Casein (a milk derivative)
  - Starch
  - NFDM

**CUSTOMIZED**

- **Fats**
  - Dairy/Butterfat
  - Conjugated Oils (DHA, EPA, CLA)

- **Carbohydrates**
  - Sugar
  - Lactose

- **Primary Emulsifier**
  - Micellar Casein
  - Whey
  - MPI
  - Oat Bran
Creaming Agents

Functionality & Benefits

• Add creaminess and opacity
• Enhance color and flavor
• Improve texture and mouthfeel
• Create structure and stability
• Deliver nutritional properties

Brands:
• Jerzee®
• RichMix®
• QuIC Creamer™
• Qauli Cream™
• QuIC Whip™
Powdered Shortenings

Functionality & Benefits

• Dry powdered fat source (>70% fat)
• Fat delivery source – for improved texture & mouthfeel
• Adds creaminess, opacity, and adhesive

Brands:
• Centennial®
• RichMix®
• QuIC Creamer™
• Qauli Cream™
• QuIC Whip™
Whip Topping and Dessert Bases

Functionality & Benefits

- Convenient concentrated dry mix bases
- Easier storage and handling
- Add aeration, volume and structure
- Enhance texture and mouthfeel

Brands:
- Jerzee®
- RichMix®
- QuIC Creamer™
- Qauli Cream™
- QuIC Whip™
Whip Topping and Dessert Bases (cont)

- A specialty aerating emulsifier system in a convenient spray-dried powder form.

- Proprietary combination of emulsifiers

- Used in conjunction with liquid oils to make high quality trans-fat free cakes, muffins, and other aerated foam type systems:
  - Convenient powder form – easy to handle & incorporate into mixes
  - >1000% overrun attained in food foam type systems
  - High stability – builds and holds cake structure
  - Provides a moist, tender eating quality
NUTRITIONAL POWDERS

- Delivers nutritional functionality
- Mask negative flavor
- Improve product function

Functionality & Benefits
- Enhanced Flavor/Texture
- Improved appearance
- Added Stability
- Controlled Delivery
- Convenient form

End Applications
Sports Nutrition, Meal Replacement, Diet Products, Medical Health Foods, Functional Beverages, Geriatric Products, Dietary Supplements
ENCAP EMULSIFIER

A specialty aerating emulsifier system in a convenient spray-dried powder form

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Specialty Creamers

- Used when creaminess and opacity is required and the use of real cream is limited:
  - Specialty hot beverages like coffees, chai teas, hot cocoas, and cappuccinos
  - Smoothies, nutritional beverages, meal replacement beverages, prepared meals, side dishes, soups, etc.
- Creamers are customized for specific functional and nutritional requirements
  - The emulsion is a mix of oil, protein, and CHO sources with other adjunct ingredients like color and flavor added as needed
- We have a Product Selection Chart to assist in choosing the right creamer
FDA has made a preliminary determination that partially hydrogenated oils (PHOs), the major dietary source of trans fat in the processed food supply, are no longer Generally Recognized as Safe, or GRAS.

- A substance is GRAS if, through scientific study, it is generally recognized among qualified experts to be safe for its intended use.

If FDA makes a final determination that partially hydrogenated oils are not GRAS, a company could not use PHOs in food without approval from the FDA.

Source – FDA Website: [http://www.fda.gov/Food/PopularTopics/ucm373922.htm](http://www.fda.gov/Food/PopularTopics/ucm373922.htm)
• The food industry anticipates a final ruling from the FDA in June 2015 that upholds their preliminary determination that PHO’s are no longer GRAS

• Expectations are that after the final ruling a period will be given to remove PHO from food products
  – 18-24 months is a possibility for a timeline to remove PHO’s

• Supply on certain PHO contain products such as oils, emulsifiers, etc could slowly decrease as more customers move to PHO Free products
  – This happen faster than timeline given by FDA

• SensoryEffects has a vast product line of PHO free alternatives to help you make the switch
  – Custom formulation is available
PHO FREE KIT

• Current SensoryEffects PHO Products
  – Jerzee Blend 22007-S (#177502)
  – Richmix B5 (#5101)

PHO Free Alternatives

QuIC Creamer 5000 (#1045000)

Jerzee 50 – Palm (#175705)

Jerzee 50 – Sunflower CL3 (#175630)
PHO FREE KIT

- Current SensoryEffects PHO Products
  - QuIC Creamer 7005 (#1047005)

PHO Free Alternatives

- Centennial II Coconut (#178310)
- Centennial 73 – Palm NTNE (#178712)
- Centennial 72 – Sunflower (#178630)
Product Prototypes
VANILLA MEAL REPLACEMENT

Features & Benefits

- Follows clean label trend
- Fast on the go nutrition
  - 43 gram powder serving size contains 7% protein, 4% fat, 30% carb, 3% fiber
  - Add to 250mls of skim milk for a cold refreshing beverage.
- Features SensoryEffects Vital Blend Nutra Base a high protein nutritional base and Jerzee 50-Coconut IP
HIGH PROTEIN BAKED BAR

Features & Benefits

- Fortify Fit Crunch Baked Peanut Butter Bar
- SensoryEffects whip topping can add aeration to creamy portions of bars
- Features Jerzee Whip 65-Sunflower
CHOCOLATE SHAKE WITH PEA PROTEIN CREAMER

Features & Benefits

• Clean label
• Suitable for vegan applications
• No dairy or soy allergens
• Features **Jerzee 50 Sunflower HP CL** a pea protein based creamer (non GMO/IP version available)
PEA SOUP WITH PEA PROTEIN CREAMER

Features & Benefits

• Clean label
• Suitable for vegan applications
• No dairy or soy allergens
• Features Jerzee 50 Sunflower HP CL a pea protein based creamer (non GMO/IP version available)
WOMEN’S WELLNESS NUTRITIONAL BEVERAGE

Features & Benefits

- Targets women’s health market
- Adds essential fatty acid blend (high oleic sunflower, MCT, safflower, borage, flaxseed, olive, and primrose oils) vitamins and nutrients for overall women’s health
- Features Jerzee 50-Specialty Blend Creamer containing choline bitartrate.
AGGLOMERATION: COST VS. BENEFIT

Features & Benefits

- Theory of agglomeration
- Micro view of agglomerated products.
- Macro Video Clip of the dissolution on an agglomerated product
- Examples of agglomerated products
  - NFDM
  - Various drinks