Controlled Vocabulary for Describing Dietary Supplements: Language Proposals

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34th National Nutrient Databank Conference, Grand Forks, North Dakota, 12-14 July 2010
Data on dietary supplements

- Data on dietary supplements are needed and used for many purposes:
  - policy making,
  - labeling,
  - product development,
  - nutritional treatment,
  - consumer information,
  - research.

- Consumption of dietary supplements has become an important contributor of nutrient intake

- Emergence of databases on dietary supplements
  - Rapidly developing dietary supplement market makes updating the dietary supplement database a challenging and time-consuming task
  - Recommendation for the construction and compilation of dietary supplement databases are needed
European dietary supplement databases

• Finland
  – 1985-2010
  – 491 dietary supplements plus default product types
    – integrated into the Finnish food composition database

• The Netherlands
  – 2003-2010
  – 800 products

• France, Denmark, Italy, Ireland

### Distribution of product groups in NES (n=1771)

- **Vitamin-mineral supplements**: 154
- **Vitamin supplements**: 138
- **Mineral supplements**: 106
- **Fatty acid supplements**: 65
- **Probiotic supplements**: 16
- **Fiber supplements**: 12
- **Yeast supplements**:
- **Enzyme supplements**:
- **Herbal supplements**:
- **Homeopathic supplements**:
- **Anthroposophic supplements**:

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Harmonizing food data documentation and interchange

- Initiatives within Europe and internationally, focused on improving and harmonizing food data documentation and interchange
- European project CEN/TC 387 to create a standard data structure for food data interchange
  - EuroFIR Network of Excellence
    http://www.eurofir.org
  - Food and Beverage Extension to the GS1 GDSN Trade Item standard
    http://www.gs1.org/productssolutions/gdsn/gpc/
LANGUAL

- an international framework for food description!

LANGUAL

THE INTERNATIONAL FRAMEWORK FOR FOOD DESCRIPTION

LANGUAL is a Food Description Thesaurus

LANGUAL stands for "Langua Alimentaria" or "language of food". It is an automated method for describing, capturing and retrieving data about food. The work on LANGUAL was started in the late 1970's by the Center for Food Safety and Applied Nutrition (CFSAN) of the United States Food and Drug Administration as an ongoing co-operative effort of specialists in food technology, information science and nutrition.

Since then, LANGUAL has been developed in collaboration with the US National Cancer Institute (NCI), and, more recently, its European partners, notably in France, Denmark, Switzerland and Hungary. Since 1996, the European LANGUAL Technical Committee has administered the thesaurus.

The thesaurus provides a standardised language for describing foods, specifically for classifying food products for information retrieval. LANGUAL is based on the concept that:

- Any food (or food product) can be systematically described by a combination of characteristics
- These characteristics can be categorised into viewpoints and coded for computer processing
- The resulting viewpoint/characteristic codes can be used to retrieve data about the food from external databases

LANGUAL is a multilingual thesaurus system using facetted classification. Each food is described by a set of standard, controlled terms chosen from facets characteristic of the nutritional and/or hygienic quality of a food, as for example the biological origin, the methods of cooking and conservation, and technological treatments.

One problem concerning multilingual thesauri is the multiplicity of natural languages: corresponding terms of different languages are not always semantically equivalent. It was chosen to render LANGUAL language-independent, to be used in the USA and Europe for numeric data banks on food composition (nutrients and contaminants), food consumption and legislation. Each descriptor is identified by a unique code pointing to equivalent terms in different languages (e.g. Danish, English, French, German, Italian, Spanish and Hungarian).

LANGUAL thus facilitates links to many different food data banks and contributes to coherent data exchange. LANGUAL is the only generally recognised method in common use for describing, capturing and retrieving data about food, adapted to computerised national and international food composition and consumption databanks.

New version 2008 of the LANGUAL thesaurus

The new version of the LANGUAL thesaurus, LANGUAL 2008, was released 30 July 2008. The new version of the LANGUAL 2008 thesaurus includes a multilingual thesaurus in Danish, English, French, German, Italian and Spanish. For more information on the
LANGLUAL - an international framework for food description!

THE LANGUAL 2008 Thesaurus - SYSTEMATIC DISPLAY

Descriptor: PRODUCT TYPE, USA [A0289]
Scope note: This term is for CLASSIFICATION ONLY: DO NOT USE term in indexing. Use a more precise narrower term.
Additional Information: Food group having common consumption, functional or manufacturing characteristics, e.g. "FRUIT OR VEGETABLE PRODUCT", "DAIRY PRODUCT", "CONFECTIONARY", "PREPARED FOOD PRODUCT", etc. [FDA CFSAN 1995]

Showing 31 terms

A. PRODUCT TYPE [A0289]
  - FOOD ADDITIVES [A0323]
  - PRODUCT TYPE, EUROPEAN UNION [A0356]
  - CIAA FOOD CLASSIFICATION FOR FOOD ADDITIVES [A0357]
  - CLASSIFICATION OF PRODUCTS OF PLANT AND ANIMAL ORIGIN, EUROPEAN COMMUNITY [A1220]
  - EUROCODE 3 FOOD CLASSIFICATION [A0642]
  - EUROFIR FOOD CLASSIFICATION [A0777]
  - EUROPEAN FOOD GROUPS (ESG) [A0690]
  - PRODUCT TYPE, INTERNATIONAL [A0382]
  - CLASSIFICATION OF FOOD AND FEED COMMODITIES [CODEX ALIMENTARIUS] [A0642]
  - FOOD CLASSIFICATION FOR FOOD ADDITIVES [CODEX ALIMENTARIUS] [A0390]
  - GENERAL STANDARD FOR CHEESE [CODEX ALIMENTARIUS] [A1207]
  - GLOBAL PRODUCT CLASSIFICATION (GSP) [A0874]
  - PRODUCT TYPE, NOT KNOWN [A0001]
  - PRODUCT TYPE, OTHER [A0004]

B. PRODUCT TYPE, USA [A0289]
  - PRODUCT TYPE, U.S. CODE OF FEDERAL REGULATIONS, TITLE 21 [A1270]
  - PRODUCT TYPE, U.S. HANDBOOK OF STANDARD REFERENCE [A1766]

C. FOOD SOURCE [A1564]
D. PART OF PLANT OR ANIMAL [C0116]
E. PHYSICAL STATE, SHAPE OR FORM [E0112]
F. EXTRAY OF HEAT TREATMENT [F0011]
G. COOKING METHOD [G0002]
H. TREATMENT APPLIED [H0111]
J. PRESERVATION METHOD [J0107]
K. PACKING MEDIUM [K0026]
M. CONTAINER OR WRAPPING [M0100]
N. FOOD CONTACT SURFACE [N0010]
P. CONSUMER GROUP/DIETARY USE/LABEL CLAIM [P0028]
R. GEOGRAPHIC PLACES AND REGIONS [R0010]
Z. ADJUNCT CHARACTERISTICS OF FOOD [Z0009]
How food description is stored

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<tr>
<th>FOODID</th>
<th>ORIGFDNM</th>
<th>LANGUALCODES</th>
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<tr>
<td>6442</td>
<td>Vitamin drops, Aldi ACE sugar-free drops (fortified)</td>
<td>A0723 A0870 B0001 C0001 E0147 F0014 G0003 H0117 H0159 H0163 J0001 K0003 M0001 N0001 P0024 P0184 R0001</td>
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<tr>
<td>8002</td>
<td>Redoxon vitamin C soluble 250 mg tablet / Rubex chewable tablet</td>
<td>A0723 A0870 B0001 C0001 E0147 F0001 G0003 H0215 J0001 K0003 M0001 N0001 P0095 R0001</td>
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<td>8004</td>
<td>Redoxon vitamin C soluble 1000 mg effervescent tablet</td>
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<td>8005</td>
<td>Haliborange Originals with vitamins A, C and D</td>
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<td>8009</td>
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<td>8031</td>
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<tr>
<td>8041</td>
<td>Seven Seas 1 A Day Vitamin C Plus Bioflavonoids and Blackcurrant</td>
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<tr>
<td>8045</td>
<td>Eskimo-3 (liquid) fish oil supplement with vitamin E</td>
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</tr>
<tr>
<td>8047</td>
<td>Eye Q (capsule) with vitamin E</td>
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<td>8048</td>
<td>Boots Children's Multivitamin syrup (sugar free)</td>
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</tr>
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<td>8049</td>
<td>Boots Children's Chewable Multivitamins, orange flavour</td>
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<td>8054</td>
<td>Ferrograd C (Abbott)</td>
<td>A0723 A0870 B0001 C0210 E0147 F0001 G0003 H0117 H0159 H0163 J0001 K0003 M0001 N0001 P0024 R0001</td>
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<tr>
<td>8072</td>
<td>Holland &amp; Barrett Chewable Calcium / Calcichew Tablet</td>
<td>A0723 A0870 B0001 C0210 E0147 F0001 G0003 H0117 H0159 H0163 J0001 K0003 M0001 N0001 P0024 R0001</td>
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<tr>
<td>8073</td>
<td>Spatone Iron</td>
<td>A0723 A0870 B0001 C0210 E0147 F0001 G0003 H0117 H0159 H0163 J0001 K0003 M0001 N0001 P0024 R0001</td>
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<td>8074</td>
<td>Lifeplan Zinc</td>
<td>A0723 A0870 B0001 C0210 E0147 F0001 G0003 H0117 H0159 H0163 J0001 K0003 M0001 N0001 P0024 R0001</td>
</tr>
<tr>
<td>34th National Nutrient Databank Conference, 12-14 July 2010</td>
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</tbody>
</table>
Expanding the LanguaL thesaurus

• The LanguaL thesaurus must be expanded to allow standardized, systematic description of dietary supplements in food composition databases and in the future European Food Data standard CEN/TC 387.

• Collaboration with US Office of Dietary Supplements

• Opportunity to define a harmonized classification scheme for dietary supplements
European legislation on dietary supplements

- EC vertical regulation **2002/46/EC** (directive defining food supplements)
- EC vertical regulation **2006/1170** (lists vitamins and minerals, and their chemical forms allowed in food supplements)
- EC transversal regulations relating to foodstuffs
  - 90/496/EC and 2008/100/EC (labeling)
  - 1924/2006 (nutrition and health claims)
- Food supplements means foodstuffs the purpose of which is to supplement the normal diet and which are concentrated sources of nutrients or other substances with a nutritional or physiological effect, alone or in combination, marketed in dose form, namely forms such as capsules, pastilles, tablets, pills and other similar forms, sachets of powder, ampoules of liquids, drop dispensing bottles, and other similar forms of liquids and powders designed to be taken in measured small unit quantities.
Proposed classification of dietary supplements according to TYPE (LanguaL facet A. Product Type)

- **DIETARY SUPPLEMENT TYPE**
  - **VITAMIN SUPPLEMENT**
    - Multivitamin supplement
    - Single vitamin supplement
  - **MINERAL SUPPLEMENT**
    - Multi mineral supplement
    - Single mineral supplement
  - **BOTANICAL OR HERBAL SUPPLEMENT**
  - **AMINO ACID OR PROTEIN SUPPLEMENT**
  - **METABOLITE, EXTRACT OR ISOLATE SUPPLEMENT**
    - Fatty acid or fat supplement
    - Phytoestrogen supplement
  - **DIETARY SUPPLEMENT, COMBINATION**
    - VITAMIN-MINERAL COMBINATION SUPPLEMENT
      - Single vitamin/single mineral supplement
      - Multivitamin-mineral supplement
    - BOTANICAL SUPPLEMENT WITH VITAMINS OR MINERALS
      - BOTANICAL SUPPLEMENT WITH VITAMINS
      - BOTANICAL SUPPLEMENT WITH MINERALS
      - BOTANICAL SUPPLEMENT WITH MULTIVITAMIN-MINERALS
    - MULTI VITAMIN-MINERAL AND AMINO ACID COMBINATION SUPPLEMENT
    - MULTI VITAMIN-MINERAL AND FATTY ACID COMBINATION SUPPLEMENT
  - **DIETARY SUPPLEMENT, OTHER**
    - ELECTROLYTE SUPPLEMENT
    - FIBER SUPPLEMENT
    - Carbohydrate supplement
    - Enzyme supplement

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Indexing ingredients with LanguaL

• Main ingredient: LanguaL facets B (source) and C (part of plant or animal)
  – **Plant & animal sources**: links to authoritative sources, additional descriptors added as needed
    • Evening primrose oil capsules:
      EVENING PRIMROSE [B2109], SEED OIL [C0307]
    • Cod liver oil: COD [B1842], LIVER OIL [C0301]
  – **Algae, bacteria or fungus sources**
    • Brewer’s yeast, dried:
      YEAST [B1345], PART OF ALGAE OR FUNGUS [C0247]
  – **Chemical sources** (mineral or excipient)
    • CALCIUM CARBONATE [B3031],
      PART OF PLANT OR ANIMAL NOT APPLICABLE [C0005]
Indexing ingredients with LanguaL

• Other ingredients: choose from Facet H

  – Nutrients added
    • VITAMIN D ADDED [H0214]
    • IRON ADDED [H0181]

  – Additives and other substances
    • CALCIUM SULPHATE ADDED [H0478]
    • CELLULOSE ADDED [H0218]
    • LACTOSE ADDED [H0157]

    "include EC Directive 2002/46/EC positive list of substances that may be used in the manufacture of vitamin/mineral supplements"

  – Substance removed
    • WATER REMOVED [H0138]
Proposed classification according to SUPPLEMENT FORM (LanguaL facet E. Physical State)

- SUPPLEMENT FORM
  - TABLET
    - CHEWABLE TABLET
    - NON-CHEWABLE TABLET
      - Effervescent Tablet
  - CAPSULE
    - SOFTGEL CAPSULE
    - Gel Cap
  - POWDER, SUPPLEMENT FORM
    - Granules
  - BAR, SUPPLEMENT FORM
  - LIQUID, SUPPLEMENT FORM
    - Oral drops
    - Syrup
    - Spray
    - Parenteral preparation
      - Solution for injection
      - Solution for infusion
  - SUPPLEMENT FORM, OTHER
    - WAFER
    - LOZENGE OR STRIP
    - GEL
    - GUMMIE
    - TEABAG

Pragmatic approach: include prescription supplements that contribute to nutrient intake
Intended USER GROUP (Language facet P. Consumer Group/Dietary Use/Label claim)

• CONSUMER GROUP [P0136]
  – ANIMAL CONSUMER [P0021]
  – HUMAN CONSUMER [P0026]
  – HUMAN CONSUMER, NO AGE SPECIFICATION [P0024]
  – HUMAN CONSUMER, FOUR YEARS AND ABOVE
    • ADULT CONSUMER [P0118]
      – Men
      – Women
        » PREGNANT OR LACTATING WOMEN
        » Menopaused Women
      – Seniors
        » Menopaused Women
  • Children/Teenagers
  • INFANT OR TODDLER [P0020]
Nutrition claims

- Nutrition claims in LanguaL Facet P require updating for dietary supplements:
  - GENERAL LABEL CLAIM [P0095]
    - "HIGH" LABEL CLAIM [P0130]
    - "SOURCE OF" LABEL CLAIM [P0134]
    - ...
  - NUTRITION-RELATED CLAIM OR USE [P0065]
    - ENERGY SPECIAL CLAIM OR USE [P0045]
    - FIBER SPECIAL CLAIM OR USE [P0049]
    - PROTEIN SPECIAL CLAIM OR USE [P0202]
    - VITAMIN- OR MINERAL-RELATED CLAIM OR USE [P0095]
Health claims

• HEALTH-RELATED CLAIM [P0124]
  – DIABETIC OR SUITABLE FOR DIABETICS CLAIM [P0198]
  – TOOTH DECAY-RELATED CLAIM [P0125]
  – Calcium and osteoporosis
  – Folate and neural tube defects
  – Soluble fiber from certain foods and risk of coronary heart disease

• Qualified Health Claims
  – 0.8 mg folic acid and neural tube birth defects
  – vitamins and vascular disease
  – selenium and cancer
  – antioxidant vitamins and cancer
  – phosphatidylserine and cognitive dysfunction and dementia
  – omega 3 fatty acids and coronary heart disease
  – monounsaturated fatty acids form olive oil and coronary heart disease
  – green tea and cancer
  – chromium picolinate and diabetes
  – calcium and colon/recatal cancer
  – calcium and recurrent colon/rectal polyps
  – calcium and hypertension
  – calcium and pregnancy induced hypertension and preeclampsia
  – unsaturated fatty acids from canola oil and reduced risk of coronary heart disease
  – corn oil and corn oil containing products and a reduced risk of heart disease
Health claims (2)

- Structure Function Claims
  - “General health”, structure function claim
  - “Immune function”, structure function claim
  - "Sports", structure function claim
  - "Energy", structure function claim
  - "Weight loss", structure function claim
  - "Mental health /brain health", structure function claim
  - "Occasional insomnia", structure function claim
  - "Supports mood", structure function claim
  - "Menopause", structure function claim
  - "Cardiovascular heart health", structure function claim
  - "Joint health", structure function claim
  - "Sexual health" , structure function claim
  - "Bone health", structure function claim
  - "Gastrointestinal health", structure function claim
  - "Modulates blood glucose levels", structure function claim
  - "Hair, skin and nails", structure function claim
  - "Vision/eye health", structure function claim
  - Structure function claim disclaimer
Other claims (LanguaL facet P)

- RELIGION- OR CUSTOMS-RELATED CLAIM [P0126]
  - HALAL CLAIM [P0187]
  - KOSHER CLAIM [P0127]
  - SUITABILITY FOR VEGAN/VEGETARIAN CLAIM [P0199]

- FOOD ALLERGEN LABELLING [P0213]
  - SOYBEANS AND PRODUCTS THEREOF [P0219]
  - …

- Examples of other label claims in LanguaL:
  - CAFFEINE FREE CLAIM [P0117]
  - "NATURALLY/NATURAL" LABEL CLAIM [P0209]
  - NO ARTIFICIAL SWEETENERS CLAIM [P0104]
  - NO COLOR ADDED CLAIM [P0098]
  - NO FLAVOR ADDED CLAIM [P0102]
  - ORGANIC CLAIM [P0128]
  - PROBIOTIC CLAIM [P0194]
  - UNSWEETENED CLAIM [P0105]

- Warning statements
  - Out of the reach of children, warning statement
  - Pregnancy, warning statement
Packaging

- LanguaL allows packaging (facet M) and surface in contact (facet N) to be indexed

<table>
<thead>
<tr>
<th>Packaging</th>
<th>Surface in contact</th>
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<tr>
<td>AMPOULE [M0196]</td>
<td>GLASS [N0040]</td>
</tr>
<tr>
<td>JAR [M0215]</td>
<td>PLASTIC [N0036]</td>
</tr>
<tr>
<td>GLASS CONTAINER, PLASTIC LID OR STOPPER [M0134]</td>
<td>GLASS [N0040], PLASTIC [N0036]</td>
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<td>ALUMINUM TUBE, UNLINED PLASTIC TOP [M0139]</td>
<td>ALUMINUM [N0042], PLASTIC [N0036]</td>
</tr>
<tr>
<td>Blister packet</td>
<td>PLASTIC [N0036], ALUMINUM [N0042]</td>
</tr>
</tbody>
</table>
Other characteristics (Linguistic facet Z. Adjunct Characteristics)

• USDA ARS Dietary Supplement Ingredient Database (DSID-1) also includes sales origin in product type => proposal to index distribution channels (retail, pharmacy…)

• DISTRIBUTION CHANNEL
  – RETAIL
    • ELECTRONIC COMMERCE (internet sales/ e-commerce)
    • HEALTH-FOOD STORE
    • STORE (supermarket/ retail store /variety store)
  – DIRECT MARKETING
    • TELEMARKETING (telephone marketing)
    • TELEVISION MARKETING
  – EXCLUSIVE DISTRIBUTION
    • HEALTH CLUBS
    • PHARMACY (drugstore)
    • PHYSICIAN’S OFFICE
  – MULTI-LEVEL MARKETING (network marketing /pyramid sales)
Other characteristics (facet Z)

- Prolonged release (tablets, capsules)
- Encapsulated (coated/covered)
- Color

<table>
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<th>USDA NDL proposal</th>
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<tr>
<td>Z0256</td>
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<td>Z0262</td>
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<td>Z0263</td>
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Choose most appropriate descriptors from the LanguaL thesaurus

- SUPPLEMENTAL FORMULATION (US CFR) [A0308]
- BOTANICAL OR HERBAL SUPPLEMENT [A----]

- HUMAN CONSUMER, NO AGE SPECIFICATION [P0024]
- "NATURALLY/ NATURAL" LABEL CLAIM [P0209]
- "HIGH" LABEL CLAIM [P0130]
- "ENERGY", STRUCTURE FUNCTION CLAIM [P----]

- PLANT USED AS FOOD SOURCE [B1347]
- POLLEN [C0279]
- WATER REMOVED [H0138]
- GRANULES [E----]
- JAR [M0215]
- PLASTIC [N0036]
- GEOGRAPHIC PLACE OR REGION NOT KNOWN [R0001]

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Choose most appropriate descriptors from the LanguaL thesaurus

- DIETARY SUPPLEMENT (CODEX) [A0398]
- DIETARY SUPPLEMENT (EUROFIR) [A0870]
- SUPPLEMENTAL FORMULATION (US CFR) [A0308]
- SINGLE VITAMIN/SINGLE MINERAL SUPPLEMENT [A----]
- TABLET [E----]
- ADULT CONSUMER [P0188]
- CALCIUM AND OSTEOPOROSIS, HEALTH CLAIM [P----]
- BONE HEALTH, STRUCTURE FUNCTION CLAIM [P----]
- GASTROINTESTINAL HEALTH, STRUCTURE FUNCTION CLAIM [P----]
- SOYBEANS AND PRODUCTS THEREOF, ALLERGEN LABELLING [P0219]
- PLASTIC CONTAINER, RIGID OR SEMIRIGID, PLASTIC LID [M0187]
- PLASTIC, CONTACT SURFACE [N0036]
- CALCIUM CARBONATE [B3031]
- PART OF PLANT OR ANIMAL NOT APPLICABLE [C0005]
- VITAMIN D ADDED [H0214]
- MALTODEXTRIN ADDED [H0315]
- CELLULOSE ADDED [H0218]
- TITANIUM DIOXIDE ADDED [H0733]
- POLYSORBATE 80 ADDED [H0617]
- CARNAUBA WAX ADDED [H0486]
- SUNSET YELLOW FCF, ORANGE YELLOW S ADDED [H0722]
- ...

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Conclusions

- The LanguaL Technical Committee is seeking review and consensus concerning these proposals before adding the new descriptors to the thesaurus.
- A subset of products will then be tested, using the new descriptors.
- Finally, these LanguaL descriptors can be included in a modified Food Product Indexer program to assist systematic description of dietary supplements.