USP Dietary Supplements Stakeholder Forum
Tuesday, May 15, 2018

Proteins: Dietary Supplements (and/or Foods)

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Why is the Dietary Supplement Team working on Proteins?

- Proteins can be classified and labeled as either a food or a dietary supplement (or both)
- Depends on claims and marketing/positioning (CFR 21 Chapter 1 Subchapter B Part 101)
  - Food
    - If intended as a meal replacement or as part of the diet
    - May have health claims
    - Structure function claims tend to focus on effects derived from nutritive value
  - Dietary Supplement
    - Structure/function claims may focus on non-nutritive as well as nutritive effects
    - May contain additional DS ingredients
    - All DS must have appropriate disclaimer on label for non-nutritive Structure/function claims
    - DS are not intended to "diagnose, treat, cure or prevent any disease”

Foods

Nutrition Label

Nutrition Facts

32 servings per container

Serving size **2 scoops (70g)**

Amount Per Serving

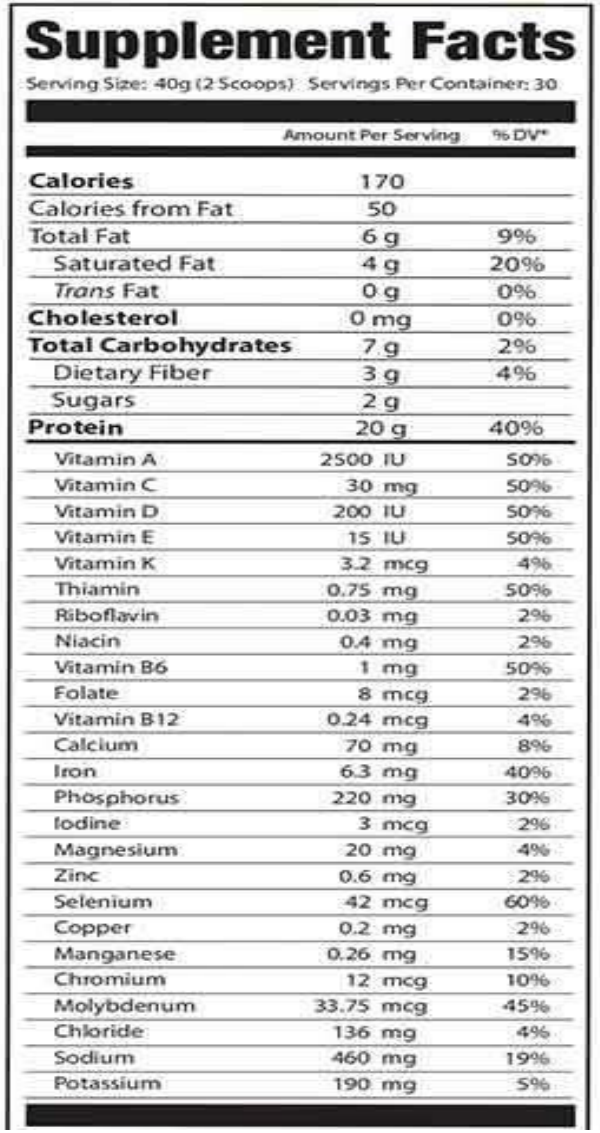
Calories **280**

	% Daily Value*
Total Fat 9g	**12%**
Saturated Fat 3.5g	**18%**
Trans Fat 0g	
Polyunsaturated Fat 0.5g	
Monounsaturated 4g	
Cholesterol 40mg	**13%**
Sodium 135mg	**6%**
Total Carbohydrate 20g	**7%**
Dietary Fiber 2g	**7%**
Total Sugars 3g	
Includes 1g Added Sugars	**2%**
Protein 32g	**64%**
Vitamin D 7mcg	35%
Calcium 585mg	45%
Iron 1mg	6%
Potassium 470mg	10%
Vitamin A 315mcg	35%
Vitamin C 32mg	35%
Phosphorus 438mg	35%
Magnesium 210mg	50%

*The % Daily Value (DV) tells you how much a nutrient in a serving of food contributes to a daily diet. 2,000 calories a day is used for general nutrition advice.

Dietary Supplement

Supplement Label



Supplement Facts

Serving Size: 40g (2 Scoops) Servings Per Container: 30

	Amount Per Serving	% DV*
Calories	170	
Calories from Fat	50	
Total Fat	6 g	9%
Saturated Fat	4 g	20%
Trans Fat	0 g	0%
Cholesterol	0 mg	0%
Total Carbohydrates	7 g	2%
Dietary Fiber	3 g	4%
Sugars	2 g	
Protein	20 g	40%
Vitamin A	2500 IU	50%
Vitamin C	30 mg	50%
Vitamin D	200 IU	50%
Vitamin E	15 IU	50%
Vitamin K	3.2 mcg	4%
Thiamin	0.75 mg	50%
Riboflavin	0.03 mg	2%
Niacin	0.4 mg	2%
Vitamin B6	1 mg	50%
Folate	8 mcg	2%
Vitamin B12	0.24 mcg	4%
Calcium	70 mg	8%
Iron	6.3 mg	40%
Phosphorus	220 mg	30%
Iodine	3 mcg	2%
Magnesium	20 mg	4%
Zinc	0.6 mg	2%
Selenium	42 mcg	60%
Copper	0.2 mg	2%
Manganese	0.26 mg	15%
Chromium	12 mcg	10%
Molybdenum	33.75 mcg	45%
Chloride	136 mg	4%
Sodium	460 mg	19%
Potassium	190 mg	5%

Proteins of Interest to the Dietary Supplement Team

- Whey Protein
  - Isolate
  - Concentrate
  - Whey protein
- Vegetable Proteins
  - Pea
  - Soy
  - Rice
- Hydrolyzed collagen
- Undenatured collagen

Protein Attributes

Discussion at USP Protein Roundtable February 2017

- Identification Tests for Proteins from various sources
- Quantitative Determination of Proteins
- Determination of Purity
- Limits for Contaminants

Challenges to Developing Specifications for Proteins

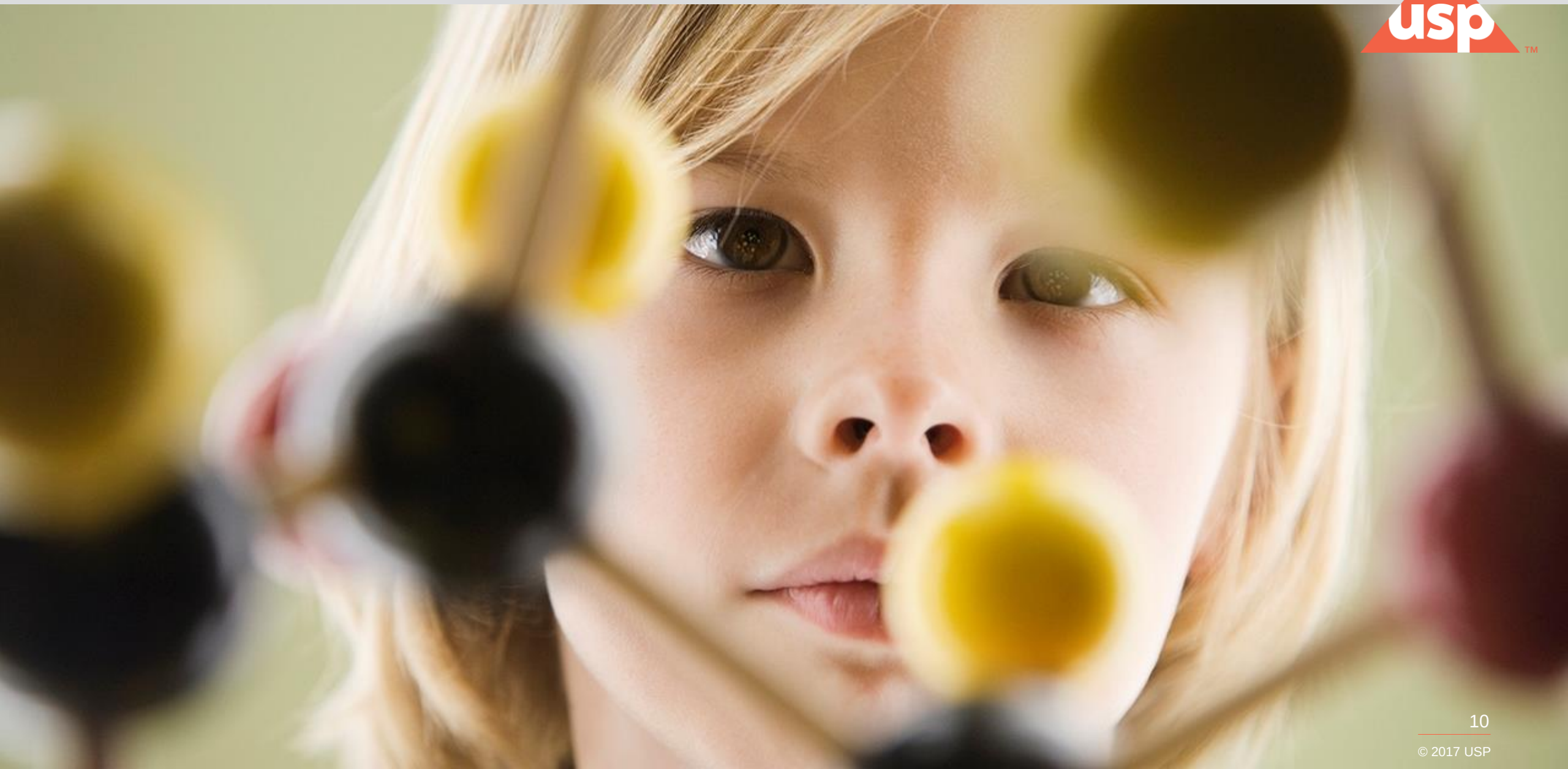
- Methods specific to a particular protein may not be available
- Specific methods may require significant development time and equipment e.g.
  - Amino Acid profiling
  - Mass spectroscopy
  - SDS page gel electrophoresis
- Protein conformation may be important (undenatured collagen)
- Natural crop variability may affect composition
- Processing method may affect composition
- Non-protein components (such as lactose, fat content etc.) may require quantification
- Non- protein specific methods (Kjeldahl or Dumas) used for protein quantification

Composition/Contamination/Purity

- Composition Tests
  - Non-protein nitrogen
  - LOD
  - Fat
  - Ash
  - Lactose (for dairy products)
- Contaminants
  - Heavy metals (arsenic is a concern for rice protein)
  - Mycotoxins (Aflatoxin) and pesticides for vegetable proteins
  - Nitrogen containing compounds (e.g. Nitrile, Nitrate, Melamine, Cyanuric acid, Urea, Amidinourea, Ammelide, Ammeline, Biuret, Cyromazin, Dicyandiamide)
  - Microbial contamination

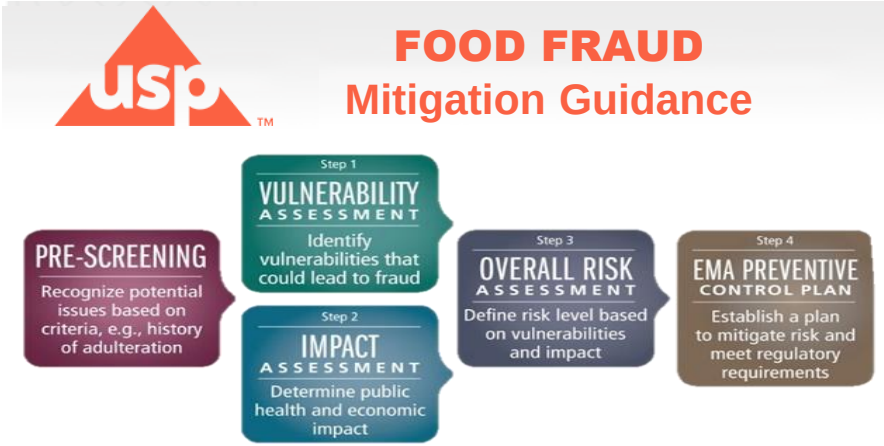
Joining Forces with Foods

- USP dietary supplement group collaborating with the Foods Group on protein specification development – Expert Panel and monograph development



USP's Food Program

A global resource for **food integrity and safety solutions** including science-based standards, tools, and services to improve confidence in the global food supply chain.



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FCC Scope

Food–grade chemicals	▸ Emulsifiers, minerals ▸ Amino acids
Processing aids	▸ Enzymes, solvents ▸ Filter media, boiler water additives
Foods	▸ Fructose, dextrose, sucrose ▸ Whey, amino acids
Flavoring agents	▸ Natural and synthetic flavors ▸ Essential oils
Functional food ingredients	▸ Olestra, salatrim, high-oleic canola oil ▸ Diacylglycerol oil, lycopene, scFOS

1966
(512 monographs)

2018
(~1200 monographs)

Dietary Proteins of Interest

- Dairy Proteins – Whey & Casein
- Pea Protein/Soy Protein
- Rice Protein
- Potato Protein
- Other Specialty Proteins

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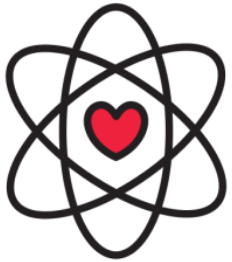
Dietary Protein Expert Panel-Background

- EMA threatens the integrity of the food supply and thereby introduces public health and other risks.

- Dietary protein ingredients usually merit premium prices, and are traded at high volume rendering them particularly susceptible to adulterations, which are not necessarily recognized utilizing current specifications and analytical methods/standards in FCC.



- The adulteration of protein ingredients has had enormous impacts on economic costs, public health, as well as public confidence on safety of food supply and government regulatory systems.

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Dietary Protein EP

Whey Protein Concentrate

Published in: FCC 10 2S | FCC 10 3S
First Published: Prior to FCC 6
Last Revised: FCC 8, First Supplement

DESCRIPTION

Whey Protein Concentrate occurs as either a liquid or a dry product. It is the substance obtained by the removal of sufficient nonprotein constituents from whey so that the finished dry product contains NLT 25.0% protein. Whey Protein Concentrate is produced by physical separation techniques such as precipitation, filtration, or dialysis. The acidity of the Whey Protein Concentrate may be adjusted by the addition of safe and suitable pH-adjusting ingredients. The final product is pasteurized.

Function: Texturizer; nutrient; emulsifier; water-binding aid; gelling agent
Packaging and Storage: Store in tight containers, protected from humidity.

IDENTIFICATION

- **Procedure**

  Acceptance criteria: A sample exhibits the compositional profile specified below with respect to *Ash (Total)*, *Fat*, *Lactose*, *Loss on Drying*, and *Protein*.

- **Protein, *Nitrogen Determination, Appendix IIIC***

  Analysis: Calculate the percentage of protein:

  $$\% \text{ Protein} = N \times 6.38$$

  N = percent nitrogen
  6.38 = nitrogen-to- protein conversion factor

  Acceptance criteria: NLT 90.0% on the dried basis

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Dietary Protein EP

- **Duration proposed:** Dec 2017-June 2020
- **Purpose:** Develop, validate, and recommend new specifications, analytical tests and related scientific documents relevant to USP for dietary proteins.
- **Outcomes:** Support the creation of new and modernization of current *FCC* monograph(s), *FCC* Identity Standard(s), or general test(s) and assay(s), as well as USP reference materials

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Dietary Protein EP-Plans

1) Develop recommendations on analytical methods and reference materials based on the needs of industry, regulators and other stakeholders;

2) Carry out or manage development and validation (potentially external) of the test methods;

3) Develop *FCC* standards (including monograph standards, identity standards, general tests and assays, etc.) with tests, specifications, and potentially reference materials for proposal to the Food Ingredients Expert Committee.

4) Manage implementation of potential *FCC* standards, academic publications and outreach to support the use of the proposed standards.

5) Coordinate with Dietary Supplement Expert Committees

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Dietary Protein EP-Priority

Matrices: Whey Protein Concentrate & Whey Protein Isolate

Methodology:

1. Amino Acid Profiling
2. LC/MS (peptide mapping and whole protein LC/MS)
3. Gel Electrophoresis

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Dietary Protein EP-Roster

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Dietary Protein EP-Meeting Plans

1) Kick-off Teleconference: March 19th 2018
2) F2F meeting: May 31st 2018
3) Future meetings in plan.

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