Discussion Agenda

- Identification Tests for Proteins from Various Sources
- Quantitative Determination of Proteins
- Determination of the Purity of Proteins
- Limits for Contaminants in Proteins
- Labelling, Packaging, Storage, and Handling
Current identification tests for proteins used in industry

- Comprehensive supplier chain qualification program helps reduce routine ID tests at the manufacturing site. Some manufacturers audit suppliers on a quarterly or annual basis.

- Typical identification tests: appearance, organoleptic, Kjeldahl, Near Infrared (NIR) for process monitoring and QC release.

- Amino acid profiling is used on a demand basis by customers.

Suggested identification tests for proteins from various sources

- Manufacturers were aware of advanced tests: electrophoresis, CE, peptide mapping, mass spectrometry, ELISA for plant based proteins.

- Suggested that amino acid profiling in combination with protein profiling with electrophoresis (SDS PAGE) is feasible and suitable.
Current quantification tests for different sources

- The standard method for protein quantification in industry is Kjeldahl or combustion (Dumas).
- NIR is commonly used for protein quantification. Total amino acid (AA) contents is believed to provide accurate protein contents.

Suggested quantification tests for protein ingredients and finished products containing proteins from various sources

- Suggested that Kjeldahl or Dumas is a widely accepted quantification method.
- Total Amino Acids (AA) can be used as a complementary method to Kjeldahl or Dumas. Total AA methods require further standardization and validation.
Impurities/specific tests for proteins

- Dairy protein industry routinely test for loss on drying (LOD), ash, fat and lactose.
- Some manufacturers test for non-protein nitrogen contents through precipitation or molecular weight filtration.
- The soy industry tests for fat and minerals.
- Rice proteins are tested for heavy metals (lead, and arsenic). Heavy metals in rice is a global concern.

Suggested purity tests for protein ingredients from various sources

- Non-protein nitrogen contents, LOD, fat, ashes, lactose for dairy proteins
Suggested tests for chemical contaminants in protein ingredients from various sources

- Mycotoxins (e.g. Aflatoxins), heavy metals, and pesticides for vegetable proteins
- Nitrogen containing compounds (e.g. Nitrile, Nitrate, Melamine, Cyanuric acid, Urea, Amidinourea, Ammelide, Ammeline, Biuret, Cyromazin, Dicyandiamide)

Suggested tests for microbiological contaminants in protein ingredients from various sources

- Stakeholders select tests for microbiological contaminants based on HACCP and their own risk assessments depending on sources.
- Suggested total plate counts (TPC), yeast-molds, *E. coli* and *Salmonella*. In addition, *Listeria* for dairy protein manufacturers.
Learnings from the Roundtable

- **Identification**
  - Should be specific to various sources and processes
  - Orthogonal approach (candidates)
    - Protein profiling (SDS PAGE)
    - Amino acid profiling

- **Assay**
  - Should address the true content of proteins.
  - Orthogonal approach (candidates)
    - Non-specific nitrogen determination (Kjeldahl or Dumas)
    - Total amino acid contents

- **Limits for Contaminants**
  - Should consider risk mitigation approaches & specific acceptance criteria.
    - Heavy metals
    - Potential adulterants (Nitrogen containing compounds)
Thank You