AVAILABLE METHODS OF ANALYSIS FOR **TOTAL NITROGEN**, **PROTEIN** AND **AMINO ACIDS**

Available method of analysis	**Limitation**	**Application**
TOTAL NITROGEN/PROTEIN		
Kjeldahl (for total nitrogen)*	Minor interference from inorganic nitrogen. Toxic wastes	Applicable to all foods
Dumas (for total nitrogen)*	Limitations are high costs, the inclusion of inorganic nitrogen and analytical portion size	Applicable to all foods
Radiochemical methods (for total nitrogen)	Very high cost of instrumentation	Applicable to most foods
Formol titration; Biuret; Folin's reagent (for protein)	Specificity	Applicable to dairy foods only
Alkaline distillation (for protein)	Specificity	Applicable to cereals only
Dye-binging (for protein)	Specificity	Applicable only to specific foods, and some cereals and legumes
NIR (for protein)	High cost; high number of calibration samples needed	Applicable to some foods

* = recommended method

Available method of analysis	Limitation	Application
AMINO ACIDS		
HPLC* (Preceded by acid hydrolysis for most AA. Alkaline hydrolysis required for tryptophan. Special hydrolysis conditions required for sulphur AA and acid-sensitive AA. AA usually derivatized prior to chromatography)	High cost	Applicable to all foods
Ion-exchange chromatography* (Preceded by acid-hydrolysis for most AA. Alkaline hydrolysis required for tryptophan. Special hydrolysis conditions required for sulphur AA and acid-sensitive AA.)	High cost. Hydrolytic losses of more labile AAs and slow release of branched chain AAs	Applicable to all foods
GLC (preceded by acid hydrolysis for most AA. Alkaline hydrolysis required for tryptophan. Special hydrolysis conditions required for sulphur AA and acid-sensitive AA.)	Moderate to high cost. Choice of derivative is critical. AA need to be derivatized prior to chromatography	Applicable to most foods
LC-MS	High cost	Applicable to all foods
Colorimetry (Tryptophan and S containing AA, lysine)	Not sensitive enough	Applicable to all foods
Microbiological assays	Tedious, time-consuming, non reproducibility	Applicable to all foods

* = recommended method