

Nutritional value and chemical index of proteins

The nutritional value of a protein depends on its capacity of liberating its amino acids, in proportion adapted to individual needs.

As a consequence the nutritional value depends, not only on its composition of necessary amino acids, but also on its biodisponibility.

The chemical index happens to be a great tool to evaluate the nutritional quality of a protein because it reveals the aptitude of the analysed protein to contain all the necessary amino acids that is to say which are not produced by the human metabolism.

Necessary amino acid	g / 100 g of protein
Cystin + Methionine	1.7
Histidine	1.6
Isoleucine	1.3
Leucine	1.9
Lysine	1.6
Phenylalanine + Tyrosine	1.9
Threonine	0.9
Tryptophane	0.5
Valine	1.3

The chemical index is the lowest ratio between the quantity of each necessary amino acid contained in a protein and the quantity of each corresponding amino acid of the reference protein. (see the chart).

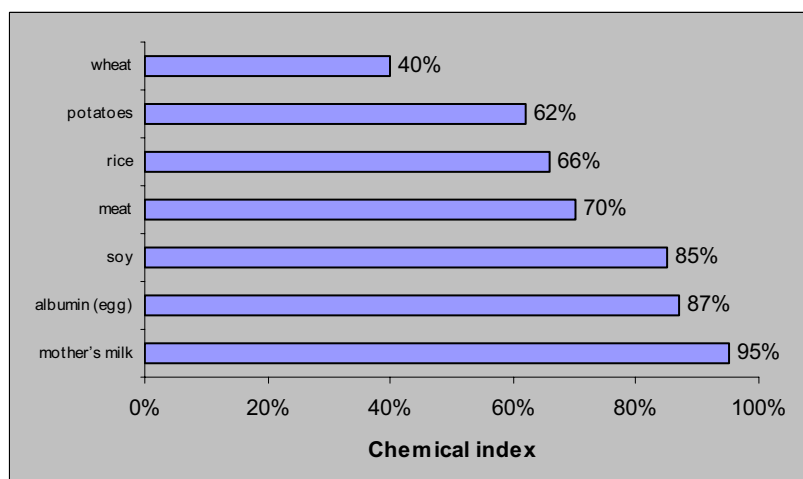
If the chemical index of a protein is below one hundred percent of the reference protein, the minimal quantity of this protein should be raised accordingly. In any case, the chemical index of the protein must equal at least 80 % of the reference protein.

Description of the referenced protein

World Health Organisation – Needs in protein and energy
– Reports of a specialists' consultation (FAO/WHO/UN)
– Geneva 1985

The analysis of amino acids is performed according to the French norms XPV 18-113 and XPV 18-114 (tryptophane analysis).

The sample is hydrolysed (acid or basic hydrolysis for the tryptophane) under vacuum at 110°C in order to break the peptidic bonds and thus to liberate the amino acids. For a better reproductibility of sulphured amino acids (cystin and methionine), it is necessary to oxidize the sample with formic acid before the acid hydrolysis. Then, the hydrolysate is analysed by an ion-exchange-liquid-chromatography with a UV detection (ninhydrine reaction). Two wavelengths are used: 440 and 570 nm, the first one being specific to proline.



Food sample chemical index examples

FAO/WHO/University of Paris V