

Determination of Protein Quality

All plant and animal proteins have the same approximate 20 amino acids. The proportion of these amino acids varies as a characteristic of the protein source, but all food proteins, except gelatin, contain some of each amino acid. The major issues, therefore, are the amounts of each essential amino acid present in the protein, the human amino acid requirement, and the digestibility of the specific protein.

Although it would be preferable to determine protein in well-controlled metabolic studies of human nitrogen balance, the cost and ethics make human experimentation impractical. A simple, scientific, and rational procedure with an underlying basis of amino acid scoring has been recommended by the FAO/WHO Joint Expert Consultation on Protein Quality Evaluation¹. This method, called protein digestibility corrected amino acid score (PDCAAS), was included in the U.S. Food and Drug Administration's November 1991² proposed rules for labeling as the required method for evaluating protein quality for humans except infants.

The PDCAAS method is based on determining the amino acid score by comparing the test protein food to the FAO/WHO 2-5 year old amino acid pattern. The 2-5 year old pattern is used because it exceeds the amino acid requirement patterns of older children and adults. The most limiting amino acid is used to determine the uncorrected amino

acid score and that number multiplied by the food's digestibility is the PDCAAS. Using this method, SUPRO[®] Brand Isolated Soy Protein has the highest obtainable score (1.0) for calculating the corrected protein value which is used to determine the percent of a protein's contribution to the Reference Daily Intake (RDI) for label display. Therefore, SUPRO protein is a highly digestible complete protein containing all the essential amino acids in the reference pattern in the correct proportion. Table 1 shows SUPRO protein compared to the FAO/WHO reference pattern for the essential amino acids and the calculated PDCAAS.

There is absolutely no advantage to exceeding the human amino acid requirement. Any excess consumed amino acids in the diet will simply be oxidized and burned as energy or the nitrogen removed and stored in the body as fat or possibly as glycogen if the diet is restricted in carbohydrate.

Table 1. Amino acid pattern of SUPRO[®] Brand Isolated Soy Protein compared to the FAO/WHO reference pattern

Essential Amino Acid	SUPRO Profile (mg/g protein)	FAO/WHO 2-5 year old (mg/g protein)
Histidine	26	19
Isoleucine	49	28
Leucine	82	66
Lysine	63	58
Methionine + Cystine	26	25
Phenylalanine	90	63
Threonine	38	34
Tryptophan	13	
Valine	50	35

SUPRO[®] Digestibility = 97%

Uncorrected Amino Acid Score = 26 divided by 25 = 1.04

Protein Digestibility Corrected Amino Acid Score = .97 X 1.04 = 100

References:

1. Protein Quality Evaluation. Report of a Joint FAO/WHO Expert Consultation. Rome, Italy. Food and Agriculture Organization and World Health Organization. Food and Agriculture Organizations of the United Nations; 1990.
2. Nutrition Labeling of Meat and Poultry Products (9 CFR 317, 320, 381). Food Labeling; General Provisions; Nutrition Labeling; Nutrient content claims, Health Claims, Ingredient Labeling; State and Local Requirements; and Exemptions; Proposed Rules (21 CFR 101, et al) Federal Register. November 27, 1991; 56:60302-60891. General Provisions; Nutrition Labeling; Nutrient content claims, Health Claims, Ingredient Labeling; State and Local Requirements; and Exemptions; Proposed Rules (21 CFR 101, et al) Federal Register. November 27, 1991; 56:60302-60891.

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