

CODEX ALIMENTARIUS COMMISSION



Food and Agriculture
Organization of the
United Nations



World Health
Organization

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Agenda Item 4b

NFSDU/40 CRD 9

Original language only

JOINT FAO/WHO FOOD STANDARDS PROGRAMME CODEX COMMITTEE ON NUTRITION AND FOODS FOR SPECIAL DIETARY USES

Fortieth Session

Berlin, Germany
26 – 30 November 2018

DRAFT REVIEW OF THE STANDARD FOR FOLLOW-UP FORMULA: SCOPE, PRODUCT DEFINITION, LABELLING

(Prepared by the Chair of the EWG of the review of the Standard for Follow-Up Formula)

Protein quality requirements for [Name of product] for young children

Background

At CCNFSDU38 there was widespread support to establish protein quality requirements for [name of product] for young children^{1,2} as formula for infants, and cows' milk are a source of high quality protein in the diets of young children, containing a source of highly digestible amino acids.

Despite this, the Committee was unable to agree on an appropriate method at that time and sought advice from the FAO regarding this matter. Discussions were based on the suitability of amino acid scoring patterns to assess protein quality, and how these should be referenced in Codex standards, particularly for foods for which they are not the sole source of nutrition. It was noted that despite the recommendations since 1989 that the Protein Digestibility Corrected Amino Acid Score (PDCAAS) method should be used, there are very few references to this method in Codex texts. Several Codex documents continue to refer to the use of the Protein Efficiency Ratio (PER) which has not been recommended by either FAO or WHO for some time.

In 2013 the FAO released a report from an expert consultation on protein quality evaluation which proposed a new measure for protein quality - the digestible indispensable amino acid score (DIAAS)³. However, it was also noted in the report that there are limitations associated with its use, mainly related to the limited data available on ileal amino acid digestibility of foods.

At CCNFSDU38, the Representative from FAO informed the Committee that the DIAAS method was not yet ready for use, and that for an interim period, the PDCAAS method should be used. As an interim measure, the Committee agreed that the quality of protein shall not be less than 85% of that of casein and agreed to the following footnote on methods to determine protein quality for [name of product] for young children:

Protein²

2) When determined by PER methodology, the quality of protein shall not be less than 85% of that of casein.

The protein quality shall be determined provisionally using the PER or PDCAAS and other methods that come available in the future.

FAO Expert Working Group

In November 2017, the FAO convened an Expert Working Group⁴ to provide guidance on the appropriate use of protein quality assessment methods for Codex, focusing on the use of the PDCAAS method.

¹ [REP17/NFSDU](#) para 82-84.

² CCNFSDU38 Physical working group report on protein quality [CRD13](#)

³ FAO. Dietary protein quality evaluation in human nutrition. FAO [Food and Nutrition Paper 92](#).

⁴ Report of the Expert Working Group on Protein Quality Assessment in Follow-up Formula for Young Children and Ready to Use Therapeutic Foods. FAO, Rome, 2018.pp38

The following questions were considered by the Expert Working Group in the process of drafting the guideline and recommendations relating to [name of product] for young children (referred to as Follow-up Formula for Young Children (FUF-YC) in the FAO Report:

- What is the protein and amino acid requirement in infants and children of the target age group, which is 1–2.9 years for FUF-YC?
- Which reference amino acid pattern to use for determination of protein quality in FUF-YC?
- What are the currently available methods to evaluate protein and amino acid digestibility for protein quality assessment? What are the limitations of these methods?
- How do anti-nutritional and environmental factors influence digestibility of food products?
- What is the PDCAAS target score for FUF-YC?
- What are the cost implications of recommended methods to define protein digestibility?

The Expert Working Group recommends the use of protein, amino acid requirements and reference scoring pattern for children in the 1–2.9 year age group for determining protein quality. The reference amino acid pattern is computed utilizing a protein requirement of 0.86 g/kg/day (0.66 g/kg/day for maintenance and 0.20 g/kg/day for growth) and the maintenance and tissue pattern of amino acids (as reported in WHO/FAO/UNU 2007, summarized in Table 1 below).

The Expert Working Group recommends using PDCAAS and appropriate digestibility values to determine protein quality of FUF-YC. A high-quality protein source will have a PDCAAS score of 100. However, a PDCAAS score of ≥ 90 can still be considered adequate for these formulations. In formulations with PDCAAS score of < 90 the quantity of protein should be adjusted to achieve the desired value. It should be noted that the ideal metric for protein quality assessment is the DIAAS. However, for practical and regulatory purposes at present, since true ileal digestibility values of individual amino acids are incomplete, the Expert Working Group recommends the use of PDCAAS.

The Expert Working Group proposes an algorithm that uses the best available methods to assess protein digestibility, depending on data availability. Member countries and/or industries are recommended to follow in order, starting with human true ileal digestibility values, growing pig true ileal digestibility values and rat true ileal digestibility values. If these are not available, human, pig, or rat fecal protein digestibility values should be used, in that order.

The Expert Working Group recommends the following in relation to protein quality assessment in FUF-YC:

- a) To use PDCAAS and appropriate fecal digestibility values to define protein quality of FUF-YC.
- b) To use reference amino acid requirements and scoring patterns of children in the 1–2.9 year age group for determining protein quality of FUF-YC (see Table 1 below).
- c) To consider effects of anti-nutritional factors and impaired gut function in the presence of poor environment and infections on digestibility.
- d) A high-quality protein source will have a PDCAAS score of 100. However, a PDCAAS score of ≥ 90 can still be considered adequate for these formulations. In formulations with PDCAAS score of < 90 the quantity of protein should be adjusted to achieve the desired value.
- e) The efficacy of new formulations should not rely on protein quality considerations alone, and should be tested for their ability to support catch up growth in the target population, which in this scenario would be children of 1 to 2.9 years for FUF-YC and 0.5 to 4.9 years for RUTF

Table 1. Protein and amino acid requirement and amino acid reference pattern proposed for FUF-YC (1–2 year)

Requirement	Protein (g/kg/d)	Amino acid (mg/kg/d)								
		His	Ile	Leu	Lys	SAA*	AAA*	Thr	Trp	Val
1–2.9 years	0.86	15	27	54	45	22	40	23	6.4	36
Amino acid reference pattern (mg/g Protein) ^a										
		His	Ile	Leu	Lys	SAA	AAA	Thr	Trp	Val
1–2.9 years		18	31	63	52	26	46	27	7.4	42

^a calculated as amino acid requirement in mg/kg/d divided by total protein requirement in g/kg/d

*SAA = sulphur amino acids (methionine + cysteine), AAA = aromatic amino acids (phenylalanine + tyrosine)