

Session Biosphere: April 12th 11.30 hrs

1s2 Healthy foods produced in circular food systems

COMPLIMENTARITY OF DIFFERENT FOOD SOURCES TO MEET AMINO ACID REQUIREMENTS

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Different food sources have different indispensable amino acid (IAA) profiles. While a single food source might lack one or more specific IAAs, the mixing different food sources can compensate the lacking IAA to meet the total requirement of IAAs. To meet the amino acid requirements, digestibility of IAAs should also be considered as not all IAAs present in the food are fully digested. Cereals (wheat, rice and maize) are one of the major sources of global protein consumption. Cereals are reported to lack one or more IAAs (specially lysine). To investigate the complementarity effect of mixing two food sources, we studied combinations of cereals (wheat, rice and maize) with pulses (beans, peas and soybean), milk, chicken, pork, beef and egg. These 24 combinations were optimized to achieve maximum amount of IAAs while providing 50 g protein. The optimization was allowed to choose amount of protein that should come from each food source in the combination. IAA profile of these combinations was then compared with amino acid reference pattern. Complementary effect was present in 19 out of 24 protein combinations tested; i.e., combining two food sources resulted in an improved amino acid profile. While for 5 combinations mixing two food sources would not result in improved amino acid profile compared to amino acid profile of individual food source (i.e., one of the food sources in the combination had a superior amount for each IAA). For the calculated digestible IAA content of the same 24 different combinations, 18 combinations had improved IAA profile compared to individual protein sources. When only amino acid composition was considered, 2 out 24 combinations did not meet recommended levels for at least one IAA, but when digestibility was also considered, this increased to 5 out of 24 combinations that were deficient in at least one IAA. Lysine and the sulphur containing amino acids were found to be the limiting IAA. This study highlights that mixing two food sources can improve amino acid profile, however not all food sources can compensate for lacking amino acid of the combination to improve overall IAA profile. Furthermore, digestibility of amino acid influence the complimentary effect of food proteins and cannot be neglected.

Keywords: Protein, Indispensable amino acid (IAA), Complementarity, Digestibility