amino acid. This constitutes a new approach to amino acid supplementation of foods. Until this procedure was developed it was common practice to supplement proteins with arbitrary amounts of the essential amino acids. Usually that amount was chosen which was considered to constitute the requirement for the species. Thus excessive supplementation took place, and often intensified amino acid imbalances. Proper supplementation, on the other hand, leading to a balance of the supplementing amino acid with the second limiting amino acid, is always beneficial.

All the important cereals, including rye, oats, and barley, are deficient in lysine. With full-scale production of lysine, supplementation of cereals would cost only a few dollars per person per year. The first limiting amino acid of peas, beans, peanuts, and many other protein foods is methionine. DL-Methionine and its α-hydroxy analog, which can replace methionine in the presence of an amino-nitrogen donor, are available as low-cost food supplements.

To learn how to make proper use of these and other amino acids to improve the protein quality of foods and to help in overcoming protein deficiencies is a tremendous challenge.

Literature Cited

1. Albanese, A. A., Higgons, R. A., Hyde, G. M., Orto, L. A., *N. Y. State J. of Med.*, **55**, 3453 (1955).
2. Albanese, A. A., Higgons, R. A., Orto, L. A., Zavattaro, D. N., *Geriatrics*, **12**, 465 (1957).
3. Bavetta, L. A., Bernick, S., *J. Am. Dental Assoc.*, **50**, 427 (1955).
4. Block, R. J., Mitchell, H. H., *Nutrition Abstr. & Rev.*, **16**, 249 (1946).
5. Culik, R., Rosenberg, H. R., *Food Technology*, **12**, 169 (1958).
6. McClure, F. J., *Proc. Soc. Exp. Biol. Med.*, **96**, 631 (1957).
7. Rohdenburg, E. L., *Ibid.*, **98**, 835 (1958).
8. Pecora, L. J., Hundley, J. M., *J. Nutrition*, **44**, 101 (1951).
9. Rose, W. C., Smith, L. C., Womack, M., Shane, M., *J. Biol. Chem.*, **181**, 307 (1949).
10. Rosenberg, H. R., J. AGR. FOOD CHEM., **5**, 694 (1957).
11. Rosenberg, H. R., Culik, R., *J. Nutrition*, **63**, 477 (1957).
12. Rosenberg, H. R., Rohdenburg, E. L., *Arch. Biochem. Biophys.*, **37**, 461 (1952).
13. Scrimshaw, N. S., Squibb, R. L., Bressani, R., Behar, M., Viteri, F., Arroyave, G., "Amino Acid Malnutrition" (Cole, W. H., ed.), Rutgers University Press, New Brunswick, N. J., 1957.

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