Letter to the Editor

The Protein Efficiency Ratios of Animal:Vegetable Protein Mixtures

Dear Dr. Visek:

Hernández et al. (1996) presented interesting data on protein digestibilities and protein efficiency ratio (PER) values for a number of animal and vegetable protein sources and their mixtures. A closer examination of the data revealed that the corrected PER values (casein = 2.50) of animal:vegetable protein sources (30:70 mixtures) and vegetable proteins may have been artificially inflated because of poor PER values for the casein control used in their study. For example, the corrected PER values of rice and casein control were similar (2.47 vs. 2.50), suggesting an artificially high protein quality for the rice (Hernández et al. 1996). To obtain a true corrected PER for rice, the casein control and rice should have been tested at the same level of dietary protein. Furthermore, the PER values of the casein control were reported to be 77, 79 and 87% of those for cooked eggs, cooked beef sirloin and milk powder, respectively (Hernández et al. 1996). The AOAC method followed by Hernández et al. (1996) recommended the use of Animal Nutrition Research Council (ANRC) reference casein, because caseins from different sources may vary in protein and amino acid compositions (Sarwar and Beare-Rogers 1984). In a collaborative study including participation of six laboratories, the average PER values for ANRC casein was reported to be 84 and 93% of egg protein and minced beef, respectively (Sarwar et al. 1984). Similarly, the PER value for ANRC casein was reported to be 102% of that of skim milk powder (Sarwar et al. 1989).

The true protein digestibility values of casein (91–93%) reported by Hernández et al. (1996) were also lower than those of 97–100% reported for ANRC casein by other researchers (Eggum et al. 1989, Sarwar et al. 1989). Similarly, the protein digestibility values of chicken leg and breast (88–89%), egg (88%), beef (sirloin and round, 88–89%), milk powder (87%) and cooked black beans (62%) reported by Hernández et al. (1996) were lower than those previously reported for similar products: chicken franks (96–99%; Eggum et al. 1989, Sarwar et al. 1989), egg protein (98%; Sarwar 1984), roast beef (100; Kuiken and Lyman 1948), minced beef (98%, Sarwar 1984), skim milk powder (93–95%; Eggum et al. 1989, Sarwar et al. 1989) and cooked black beans (72%; Sarwar and Peace 1986).

Although the AOAC method does not specify the strain of rats to be used in the PER determination, two strains [Sprague-Dawley and Wistar] are most commonly used in protein digestibility and PER determinations (Eggum et al. 1989, Sarwar et al. 1989). Hernández et al. (1996) used Fisher 344 rats in their study. There are differences in growth patterns for different strains of rats [NRC 1995], which may suggest the possibility of similar differences in protein digestion patterns. It therefore would have been useful to know the metabolic fecal protein (MFP) value [i.e., protein content of feces of rats fed protein-free diet] used in calculating true protein digestibility values by Hernández et al. (1996).

It is perfectly understandable that part of the differences between the results of Hernández et al. (1996) and those of other researchers (Eggum et al. 1989, Kuiken and Lyman 1948, Sarwar 1984, Sarwar and Peace 1986, Sarwar et al. 1989) may be due to processing and/or inherent ingredient variation. The consistently lower PER and/or protein digestibility data for casein and other animal protein sources reported by Hernández et al. (1996) highlight the need for stricter standardization of the PER and protein digestibility methods, especially in view of harmonization of regulatory methods and food standards to facilitate application of the North American Free Trade Agreement (NAFTA).

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