

Protein Quality Comparison Chart

| Protein Type | Protein Digestibility Corrected Amino Acid Score (PDCAAS) ¹ | Amino Acid Score | Protein Efficiency Ratio (PER) ² | Biological Value (BV) | Protein Digestibility % (PD) |
|-------------------------|--|------------------|---|-----------------------|------------------------------|
| Whey Protein | 1.00 | 1.14 | 3.2 | 100 | 99 |
| Whole Egg | 1.00 | 1.21 | 3.8 | 88-100 | 98 |
| Casein | 1.00 | 1.00 | 2.5 | 80 | 99 |
| Soy Protein Concentrate | 1.00 | .99 | 2.2 | 74 | 95 |
| Beef Protein | 0.92 | .94 | 2.9 | 80 | 98 |
| Wheat Gluten | 0.25 | .47 | NA | 54 | 91 |

Source:

¹ Protein Quality Evaluation, Report of the Joint FAO/WHO Consultation

² Reference Manual for U.S. Whey Products, 2nd Edition, U.S. Dairy Export Council

Methods of Assessing Protein Quality

The five methods described below are the ones most often used to assess protein quality.

1. **Protein Digestibility Corrected Amino Acid Score* (PDCAAS):** The Amino Acid Score with an added digestibility component. The PDCAAS is the current accepted measure of protein quality as it closely compares to determinations done with animals. A number of nutrition experts feel this method needs further refinement and additional changes may be seen in the future.
2. **Amino Acid Score (AAS):** A chemical technique considered fast, consistent, and inexpensive. It measures the indispensable amino acids present in a protein and compares the values with a reference protein. The protein is rated based upon the most limiting indispensable amino acid.
 - Values greater than 1.0 for both the AAS and the PCDAAS are considered to indicate that the protein contains essential amino acids in excess of the human requirements. Therefore, in 1990 at a FAO/WHO meeting it was decided that proteins having values higher than 1.0 would be rounded down to 1.0. This point is under debate as experts feel that the rounding down of high quality proteins fails to reflect the ability of the protein to complement the nutritional value of a lower quality protein.
3. **Protein Efficiency Ratio (PER):** Measures the ability of a protein to support the growth of a weanling rat. It represents the ratio of weight gain to the amount of protein consumed. This method has two major concerns. First is the concern that it may not be applied to growing infants and children as the amino acid growth requirement for infants is less than those for rats. Second, the PER measures growth but not maintenance so it may be of limited use in determining the protein needs of adults.
4. **Biological Value (BV):** Measures the amount of nitrogen retained in comparison to the amount of nitrogen absorbed. The BV and the NPU methods reflect both availability and digestibility and they give an accurate appraisal of maintenance needs.
5. **Nitrogen Protein Utilization (NPU):** The ratio of the nitrogen used for tissue formation versus the amount of nitrogen digested.