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Questions: what do u understand by the term biological value of protein

Answer:

* **Biological value** (**BV**) is a measure of the proportion of absorbed [protein](https://en.m.wikipedia.org/wiki/Protein) from a food which becomes incorporated into the proteins of the organism's body. It captures how readily the digested protein can be used in [protein synthesis](https://en.m.wikipedia.org/wiki/Protein_biosynthesis) in the [cells](https://en.m.wikipedia.org/wiki/Cell_%28biology%29) of the organism. Proteins are the major source of [nitrogen](https://en.m.wikipedia.org/wiki/Nitrogen) in food. BV assumes protein is the only source of nitrogen and measures the proportion of this nitrogen absorbed by the body which is then excreted. The remainder must have been incorporated into the proteins of the organisms body. A [ratio](https://en.m.wikipedia.org/wiki/Ratio) of nitrogen incorporated into the body over nitrogen absorbed gives a measure of protein "usability" – the BV.

Unlike some measures of protein usability, biological value does not take into account how readily the protein can be [digested](https://en.m.wikipedia.org/wiki/Digestion) and absorbed (largely by the [small intestine](https://en.m.wikipedia.org/wiki/Small_intestine)). This is reflected in the experimental methods used to determine BV.

BV uses two similar scales:

1. The true percentage utilization (usually shown with a percent symbol).
2. The percentage utilization relative to a readily utilizable protein source, often [egg](https://en.m.wikipedia.org/wiki/Egg_%28food%29) (usually shown as unitless).

These two values will be similar but not identical.

The BV of a food varies greatly, and depends on a wide variety of factors. In particular the BV value of a food varies depending on its preparation and the recent diet of the organism. This makes reliable determination of BV difficult and of limited use — fasting prior to testing is universally required in order to ascertain reliable figures.

BV is commonly used in nutrition science in many [mammalian organisms](https://en.m.wikipedia.org/wiki/Mammals), and is a relevant measure in humans.[[1]](https://en.m.wikipedia.org/wiki/Biological_value#cite_note-Methodology-1) It is a popular guideline in [bodybuilding](https://en.m.wikipedia.org/wiki/Bodybuilding) in protein choice.

2)

* Protein efficiency ratio
* Net protein ratio
* Relative nutritive value
* Nitrogen balance index

**Protein Efficiency Ratio (PER)**

As has been indicated, qualitative differences in protein quality can be

demonstrated by many methods. Protein Efficiency Ratio (PER) has been the

method most widely used because of its simplicity. Osborne, Mendel and Ferry (30)

observed that young rats fed certain proteins gained little weight and ate little

protein whereas those which were fed better quality proteins gained more weight

and consumed more protein. In an attempt to compensate for the difference in food

intake, they calculated the gain in weight per gram of protein eaten and this has

been called PER. It is known that the PER for any protein is dependent upon the

amount of protein incorporated in the test diet. Standardized conditions have

therefore been proposed (31). These include the use of 10 weanling rats per test

group, diets containing 9.09% protein (N × 6.25), a test period of 4 weeks' duration,

and that each experiment include a group which receives standardized casein. The

PER is calculated as the average total weight gain divided by the average grams of

protein consumed. Since PER in various laboratories was not constant for the same

protein, it was recommended that a corrected value be calculated using an

assumed PER of the standardized casein of 2.50 (Corrected PER = 2.50 ×

PER/PER of reference casein)

**Net Protein Ration (NPR)**

A major criticism of the PER has been that it does not take into account the protein

required for maintenance since only gain in weight is used in the calculation.

Bender and Doell (36) suggested that this criticism could be avoided by the

inclusion in each test of a group of animals fed a protein-free diet.

**Net Protein Ratio**

(NPR) was then calculated as the overall difference in gain (gain in weight of the

test group plus loss in weight of the protein-free group) divided by the protein eaten.

It is apparent that if body composition is constant, this procedure is identical to NPU

except that it is expressed in arbitrary units which are less useful than the

percentage of protein utilized. The weaknesses are, of course, identical with those

discussed under NPU.

**Relative Nutritive Value (RNV)**

Hegsted et al. (34, 37, 38, 39) proposed a slope-ratio assay using rats in which the

slope of the regression line relating body protein (or body water) of a standard

protein (egg protein or lactalbumin) assumed to have maximal nutritive value was

compared to that of the test protein. The tacit assumption made in the

measurement of NPU or BV that these values are independent of the level of

protein fed is thus tested in this procedure. As in the calculation of NPU and BV the

original assumption was made that the regression line should bisect the Y axis at

the point defined by the group fed the protein-free diet. As has already been

discussed above, this often and perhaps, usually, does not happen. The regression

lines above the maintenance level of intake are, however, linear over a substantial

range of intakes with young growing rats (40) contrary to the conclusions of Miller

and Payne (28). In young growing rats where maintenance requirements are

relatively small compared to the growth requirements, this method is probably the

most logically defensible of the assays available as an estimate of the protein

quality for growth. The important question remains as to whether estimates of

protein quality for growth in young rats are adequate estimates of quality for man

including those of the young infant. Presumably, many proteins will be more

efficiently utilized in human beings than they are for young growing rats.

**Nitrogen Balance Index**

Allison and Anderson (41) showed, as has been discussed above, that Biological

Value is the slope of the regression line relating nitrogen balance and nitrogen

intake and suggested that this might have certain advantages in practice over the

usual method of determining BV. The concept of this index is rather similar to

Relative Nutritive Value discussed above. Since it is becoming increasingly clear

that nitrogen retention is not linearly related to nitrogen intake in the region of intake

below maintenance, the validity of this index requires confirmation.