

Whey - A Fabulous Source of Quality Protein

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What Is Whey Protein

The two main proteins in milk are casein and whey. Casein accounts for 80% of the protein and whey accounts for 20%. Although they are both excellent sources of protein, whey protein is more familiar to the general public. This is due to the fact that it is seen on sale in gigantic displays in most gyms, grocery stores, and wholesale food establishments. It has been popularized by body builders for decades. There is good reason for this.

Whey is an extremely high quality protein source with all the essential amino acids. Essential amino acids are those not made by the body and must be obtained from what we eat. This fact qualifies whey as a “complete protein”. It is a known fact that the three branched chain amino acids (Valine, Leucine, Isoleucine) play the most significant role in muscle anabolism (1).

Whey protein is the best protein source of the branched chain amino acids (2). It is exceptionally high in leucine which is the most important of the three to body builders or individuals wishing to become fit by building muscle.

The health benefits of whey protein extend far beyond its ability to help athletes build muscle. Milk provides complete nourishment of the neonate from birth to 6 months of age, and vital support for development of the immune system. There is a growing body of evidence that whey proteins not only provide nutrition but play a role in attenuation of disease (3). There is also evidence from animal studies that whey proteins may possess anti-cancer properties (4).

Whey Is a “Fast” Protein Source

Proteins in the body are manufactured from amino acids. The speed of absorption of dietary amino acids by the intestines varies. Whey protein induces a dramatic and fast but short increase in amino acid levels. Casein induces a prolonged plateau of amino acids in the blood (8). It is for this reason that many serious bodybuilders will ingest whey protein just before a workout to induce a rapid rise in amino acid levels but then drink a shake with casein before bed to induce a more prolonged increased level of amino acids in the blood while they sleep.

Where Does Whey Protein Come From

Whey protein comes from a variety of sources. When skim milk is put through a microfiltration process to obtain micellar casein, whey proteins are a byproduct that will typically be spray dried. These are called *native whey proteins* and have a protein content of approximately 90% (5).

The majority of whey is a byproduct of manufacturing cheese. The enzyme rennet or an acid solution is used to precipitate the casein fraction of the proteins in the milk (5) in the form of a curd or precipitate (5). Whey is in the liquid remaining (called the permeate) after precipitation. Whey is also a byproduct of both cottage cheese production and Greek yogurt production. The protein content of the permeate is much lower than native whey protein obtained from micellar casein production (5).

Whey can also be drawn from the curd which is the precipitated product used to make cheese. Whey that is clotted by rennet has a higher pH and is called sweet whey and whey that is drawn from casein produced by acid casein production is called acid whey (5).

An additional step in processing whey may occur to remove the minerals in the liquid. This is done by ion exchange, precipitation, or electrodialysis and membrane filtration, depending on the mineral content desired in the final product. The demineralized whey then goes through an evaporation step and subsequently is typically spray dried resulting in demineralized whey powder. It is also possible to produce reduced lactose whey powder (5).

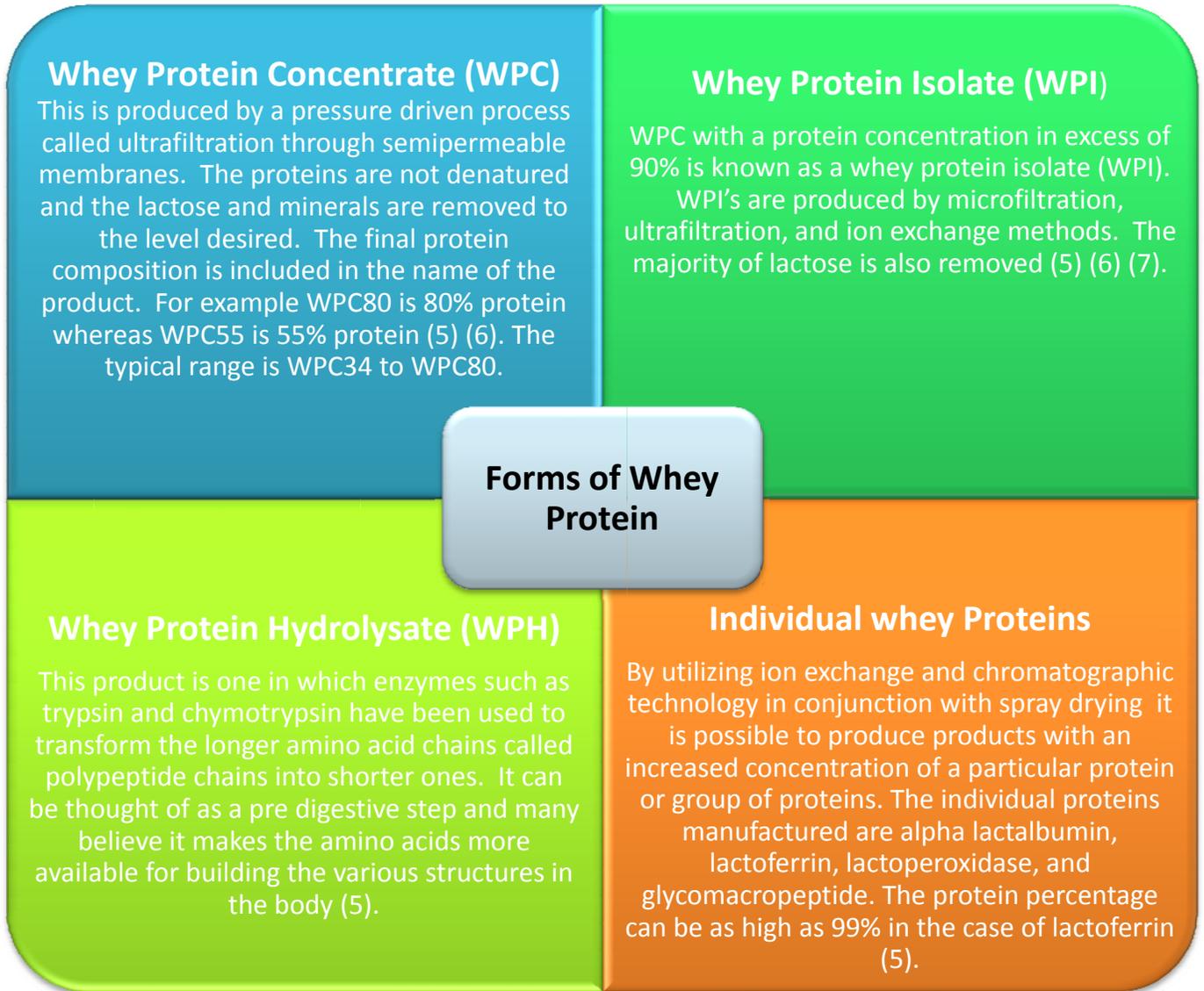
The functionality of the whey powder produced is dependent on the type of dryer used. Most whey powder is produced by spray drying because it produces a consistent product. Roller drying may also be utilized but some feel it has an increased tendency to produce product with a flaked appearance and possibly a brownish color.

There are a multitude of individual whey proteins such as albumins and globulins. Which ones you consume depend on which animal they come from. The majority of whey proteins we consume are from dairy cattle which is our predominant source of milk in the U.S. They are alpha-lactalbumin and beta-lactoglobulin (6).

After spray drying the whey powder an agglomerator may be used to increase particle size. This improves the ability of the whey powder to disperse or dissolve more quickly and is a step in "instantizing" (5).

What Forms of Whey Protein Are Available

The whey powder described above contains water, fat, lactose, ash, and protein. The protein content of the various forms of whey described is typically 15-30% depending on the product. This is far lower than what is desired by the consumer. A multitude of membrane filtration methods are therefore used along with flavoring and coloring to produce a desirable product which is also typically spray dried (5)



Conclusion

In the past whey was considered a byproduct of cheese manufacturing with little or no value. That has all changed. The food, pharmaceutical, and nutritional segments of the market are all focused on whey and whey products as functional ingredients. The demand for whey products continues to increase. Critical positive changes in more sophisticated technologies have fostered the production of quality products for the food, sports, and medical industries.

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