



Nutrition Spotlight: U.S. Dairy Proteins: High-quality and Complete Protein Sources

All dairy foods and ingredients start out as milk, which contains 3.5 percent protein — 80 percent casein and 20 percent whey. Milk protein ingredients contain the same protein ratio found in milk, while whey protein ingredients contain 100 percent whey proteins and casein protein ingredients contain 100 percent casein. U.S. dairy proteins with protein levels 80 percent and higher are widely used in health and wellness and sports nutrition products.

Benefits of Dairy Protein

Published nutrition research on the health and nutritional benefits of dairy proteins continues to rise each year, supporting the benefits of incorporating whey and milk proteins into the daily diet. Protein is an essential nutrient the body needs to build and maintain muscle. Protein also plays an integral role in the body's structure, functions and regulation of all tissues and organs.

There are many health and wellness benefits for all types of lifestyles that come from eating U.S. dairy proteins. Research shows that¹⁻¹⁸ diets higher in protein help slow muscle loss, curb hunger, maintain a healthy weight, build lean muscle (with regular resistance exercise) and enhance exercise recovery.



DID YOU KNOW

- U.S. dairy proteins score at or near the top in current methods used to measure protein quality.
- The United Nations Food and Agriculture Organization (FAO) has recommended the Digestible Indispensable Amino Acid Score (DIAAS) method to assess protein quality by its ability to supply the body with amino acids.
- U.S. whey protein is high in branched-chain amino acids and leucine content, making it unique in its ability to initiate new muscle synthesis.

U.S. Dairy Proteins: High Quality and Complete Protein Sources



Whether aiming to increase lean muscle or add muscle mass, eating U.S. dairy proteins before or after exercise can help improve body composition.



U.S. dairy proteins can help people maintain muscle as they age.



Weekend warriors, sports enthusiasts and hard-core athletes can meet their goals and recover faster from exercise with help from U.S. dairy proteins.

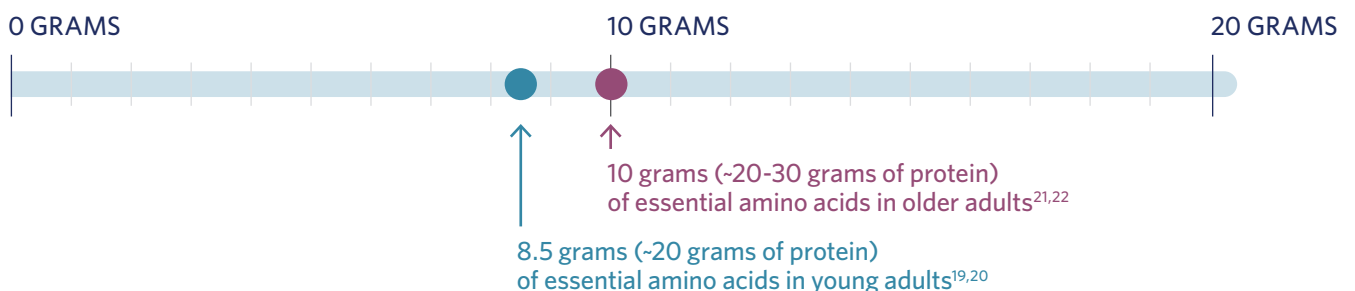


U.S. dairy proteins can help people control their hunger and maintain a healthy weight.

Not All Proteins Are Created Equal

High-quality protein — such as U.S. dairy protein — contains the essential (sourced solely from food) and non-essential (synthesized by the body) amino acids the body needs. In contrast, many plant-based proteins used as ingredients are not considered complete sources as they do not contain all of the essential amino acids.

Studies show that essential amino acids can maximally stimulate muscle protein synthesis at relatively low amounts:





SPOTLIGHT

Amino Acids

Specific essential amino acids, called branched-chain amino acids (BCAAs), play an even greater role in muscle protein metabolism as, unlike other types of amino acids, these bypass the liver and go straight to the muscle. The result is a faster rate of absorption for recovery, maintenance and growth.^{23,24,25} And, among the three BCAAs (leucine, isoleucine, valine), research shows leucine is unique in its ability to initiate new muscle synthesis.^{3,26} See how dairy protein sources stack up to other sources:

PROTEIN SOURCE	LEUCINE	BCAA
Whey Protein Isolate	14%	26%
Casein	10%	23%
Milk Protein	10%	21%
Egg Protein	9%	20%
Muscle Protein (Meat, Chicken, etc.)	8%	18%
Soy Protein Isolate	8%	18%
Wheat Protein	7%	15%

Values reflect grams of amino acids/100 grams of protein. Source: USDA Food Composition Tables modified from Layman, DK. The role of leucine in weight loss diets and glucose homeostasis. *J Nutr.* 2003;133(1):261S-267S.



Measuring Protein Quality

With increased demand for consuming protein, dietary protein quality, and the way in which protein quality is scored, is of fundamental importance. Whey and milk proteins rank at or near the top of various protein quality scoring measures in common use, such as the widely used Protein Digestibility-Corrected Amino Acid Score (PDCAAS). Yet, PDCAAS has also been shown to overestimate the quality of some plant-based proteins in comparison to animal sources. The Digestible Indispensable Amino Acid Score (DIAAS) was put forward by the United Nations Food and Agriculture Organization (FAO) in 2013 as an alternative, more accurate method than PDCAAS of describing protein quality. Dairy proteins similarly rate highly under this newer DIAAS approach which assesses the quality of dietary proteins by their ability to supply amino acids for use by the body.

PROTEIN TYPE	PDCAAS*	BIOLOGICAL VALUE	NET PROTEIN UTILIZATION	PROTEIN EFFICIENCY RATIO
Whey Protein	1.00	104	92	3.2
Milk	1.00	91	82	2.5
Casein	1.00	77	76	2.5
Egg	1.00	100	94	3.9
Soy Protein	1.00	74	61	2.2
Beef	0.92	80	73	2.9
Black Beans	0.75		0	0
Peanuts	0.52			1.8
Wheat Gluten	0.25	64	92	0.8

*Protein digestibility-corrected amino acid score

And, when compared with plant-based proteins, research shows whey protein is more beneficial for muscle growth due to its content of BCAAs, specifically leucine.²⁸ BCAAs — leucine, isoleucine, valine — are especially beneficial post-workout because, unlike other amino acids, BCAAs bypass the liver and go straight to the muscle tissue, providing a faster rate of absorption for recovery, maintenance and growth.^{29,30,28}





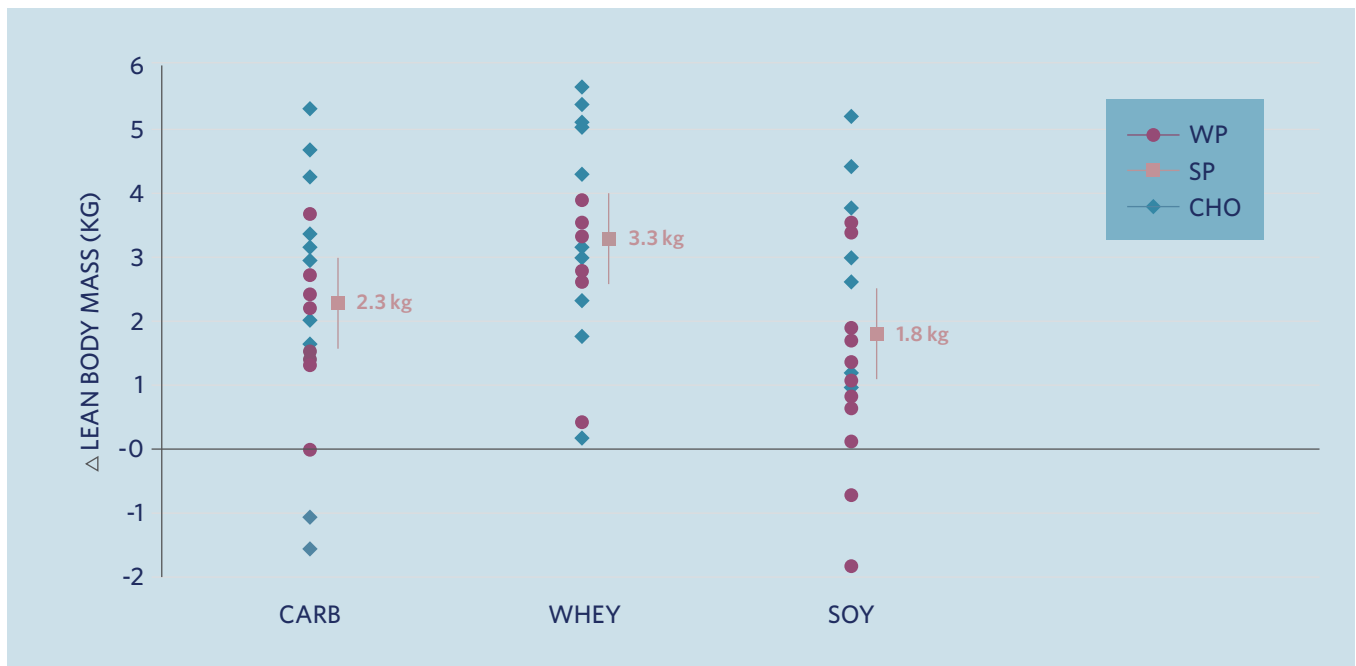
THE RESEARCH

Dairy Protein vs. Other Sources

Whey protein isolate, casein and milk protein all contain high amounts of BCAAs, and whey protein is one of the richest sources of leucine,^{31,32} making it an excellent partner when focusing on weight management. Research shows that the leucine content of protein may be the key to promoting greater gains in lean body mass with resistance exercise.²⁴ Even without exercise, whey protein has been shown to support increased weight and fat loss.⁷

A Closer Look at the Science

In a study published in the *Journal of the American College of Nutrition*, 36 men and 27 women completed a nine-month resistance exercise study consuming whey, soy or carbohydrate. An equivalent amount was consumed each day — after their exercise session on training days or at breakfast on nontraining days.



Source: Volek JS, Volk BM, Gomez AL, et al. Whey protein supplementation during resistance training augments lean body mass. *J Am Coll Nutr.* 2013;32(2):122-136.

RESULTS

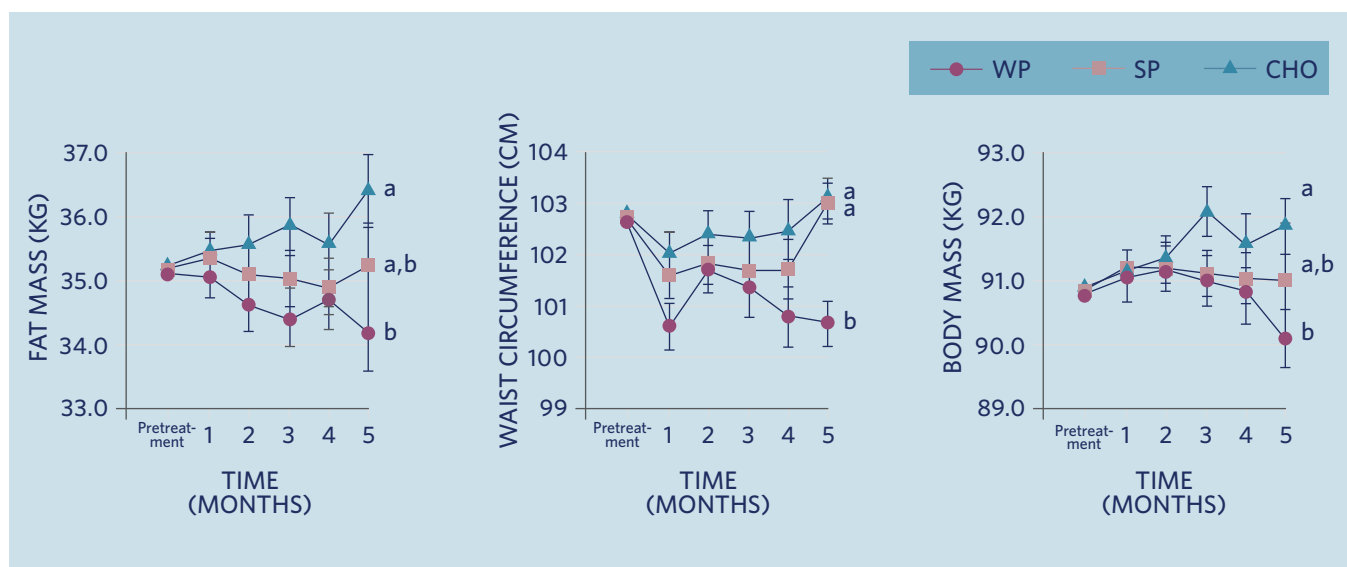
The whey group showed significant increases in lean mass (3.3 kg \pm 1.5 kg) over soy (1.8 kg \pm 1.6 kg) and carbohydrates (2.3 kg \pm 1.7 kg) at every time point tested. The results also showed that the plasma leucine levels doubled after whey consumption but only showed minimal changes in the soy and carbohydrate groups when consumed directly after exercise.

WHEY ADVANTAGE

Despite consuming similar calories and protein during resistance training, daily supplementation with whey was more effective than soy protein in promoting gains in lean body mass, highlighting that the extra leucine content in whey is an important factor in lean body mass responses to resistance training.

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In another study published in the *Journal of Nutrition*, 73 overweight and obese adults completed a 23-week clinical trial consuming 56 grams per day of whey protein, soy protein or carbohydrate as a beverage in two even doses with breakfast and dinner.



Source: Baer DJ, Stote KS, Paul DR, Harris GK, Rumpler WV, Clevidence BA. Whey protein but not soy protein supplementation alters body weight and composition in free-living overweight and obese adults. *J Nutr.* 2011;141(8):1489-1494.

RESULTS

Those who consumed whey protein had considerably less fat mass (2.3 kg lower) than the carbohydrate group. Waist circumference among the whey protein group decreased by 2.4 cm compared with the soy protein and carbohydrate groups, and body weight was 1.8 kg lower in the whey protein group.

WHEY ADVANTAGE

Diets higher in protein — in particular, whey protein — may help in long-term maintenance of body weight and composition among overweight and obese individuals even when calories are not restricted.

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ABOUT U.S. DAIRY

The United States is the world's leading single-country producer of cow's milk as well as key dairy products such as whey ingredients, lactose, skim milk powder and cheese. U.S. dairy farmers are committed to the health of their cows, caring for the environment and delighting consumers with delicious, nutritious and sustainably produced dairy products and ingredients. With multiple layers of stringent checks throughout the production process, customers and consumers can have confidence in the safety and quality of dairy from the United States.

ABOUT U.S. DAIRY EXPORT COUNCIL

The U.S. Dairy Export Council (USDEC) is a non-profit, independent membership organization that expands commercial opportunities and competitive access for U.S. dairy products and ingredients in international markets to support a thriving U.S. dairy sector. Together with its network of representatives in Southeast Asia and around the world, USDEC communicates science-based research and information on U.S. dairy's nutritional benefits and innovation possibilities to the health professional community, food and beverage importers/manufacturers and consumers, expanding global demand while helping nourish the world.



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