



U.S. Milk Powder



Enhancing Our Product Offerings

The United States is expanding the volume and scope of milk powder production to fulfill rising demand from global customers. This includes significant investments in new plants and upgrades to existing facilities. Together with the United States' strict safety and quality standards, year-round production and rising international focus, the U.S. dairy industry is well-positioned to supply a widening range of milk powders that meet customers' specifications.

U.S. Milk Powder Industry

With over 1 million metric tons produced, the United States is the world's largest single-country producer of skim milk powder/nonfat dry milk (SMP/NDM, hereafter referred to as SMP). SMP is manufactured across the United States in small and large facilities with a range of capabilities. The United States accounts for about a quarter of world SMP production, with volume continuing to expand. U.S. SMP exports are also rising in tandem, with about 50% of production now destined for overseas markets.

U.S. dairy manufacturers are also increasing production and exports of whole milk powder (WMP), in response to customer interest around the world. While accounting for less than 5% of U.S. milk powder production, WMP volume is anticipated to grow in the years ahead as new capacity comes on-line.

The U.S. dairy industry recognizes that customers have different specification needs, depending on the end-use application. U.S. milk powder manufacturers are taking action to consistently meet customers' stringent specifications for milk powders, including low-spore powder for recombining and nutritional applications.



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- The United States is the world's largest single-country producer and exporter of SMP/NDM.
- U.S. production of SMP/NDM exceeded 1 million metric tons in 2014, up 26% from 2010 and 9% from 2013.
- 9 U.S. companies (over 50% of U.S. SMP suppliers) have invested in low-spore powder capacity.
- 5 suppliers in the United States have invested in new or expanded production capacity for WMP.

Source: U.S. Department of Agriculture



Types of U.S. Milk Powder

Whether used to extend local milk supply, or for their nutritional, functional or shelf-life benefits, U.S. milk powders have become an integral part of the food and beverage industry. The United States produces a range of milk powders, with varying levels of protein, fat and water.

SKIM MILK POWDER/NONFAT DRY MILK

SMP and NDM are similar but are defined by two different sets of regulations and authorities. NDM is defined by the U.S. Food and Drug Administration, while SMP is defined by CODEX Alimentarius. Both are obtained by removing water from pasteurized skim milk. Both contain 5% or less moisture (by weight) and 1.5% or less milkfat (by weight). The difference is that SMP has a minimum milk protein content of 34%, whereas NDM has no standardized protein level. NDM and SMP are available in two forms: ordinary or non-agglomerated (non-instant) and agglomerated (instant).

Nonfat dry milk and skim milk powder are classified for use as ingredients according to the heat treatment used in their manufacture. The cumulative amount of heat used during manufacturing influences the level of undenatured protein, manipulating its functionality. There are three main classifications: high-heat, medium-heat and low-heat (figure 1).



FIG. 1: HEAT TREATMENT CLASSIFICATION FOR NDM/SMP

CLASSIFICATION	UNDENATURED WHEY PROTEIN NITROGEN (mg/g)	RECOMMENDED APPLICATIONS
Low-heat	Over 6.00	Fluid milk fortification, cheese milk standardization, cultured skim milk, starter culture, dairy drinks and recombined products, ice cream, yogurts
Medium-heat	1.51 – 5.99	Prepared mixes, ice cream, yogurts, confectionery, meat products, recombined milk products
High-heat	Under 1.50	Bakery, meat products, prepared mixes, ice cream



FIG. 2: FUNCTIONALITY OF U.S. MILK POWDER

FUNCTION	BENEFITS
Browning/Color	Accentuates color development during cooking and baking. Enhances the color of viscous products such as sauces and soups. Improves opacity in lower fat foods.
Flavor Enhancement	Can provide baked flavor during baking and heating. Can provide creamy dairy notes. Ensures even flavor distribution.
Emulsification	Creates stable emulsions. Prevents fat globules from forming one large mass, improving product appearance.
Gelling	Improves mouthfeel. Helps lubricate and provide the creamy, smooth texture of fat.
Nutritional Enrichment	Can improve the nutritional profile of a food product. Provides a natural source of vitamin and mineral fortification.
Water Binding and Viscosity Binding	Provides fat-like attributes in products, allowing a reduction in fat content. Improves product texture, creating moister products. Increases viscosity in rehydrated and fluid products.
Whipping, Foaming and Aeration	Helps maintain foam stability and improves whip volume, which enhances visual appeal of the finished product, as well as taste and texture.

WHOLE MILK POWDER

Dry whole milk and whole milk powder refer to U.S. and Codex-defined terms respectively. Dry whole milk must contain between 26% and 40% milkfat (by weight) on an “as is” basis and not more than 5.0% moisture (by weight) on a milk-solids-not-fat (MSNF) basis. Whole milk powder can contain between 26% and 42% milkfat and the protein level can be adjusted to a minimum of 34% in MSNF.

DRY BUTTERMILK

Dry buttermilk is obtained by removing water from liquid buttermilk that was obtained from the churning of cream into butter and pasteurized prior to condensing. It contains 5% or less moisture (by weight) and 4.5% or more milkfat (by weight).

Dry buttermilk must have a protein content of not less than 30%. Dry buttermilk is different from dry buttermilk product, which should have a protein content of less than 30%. Customers are encouraged to consult with suppliers on specifications needs.

Milk Powder Functionality

The functional properties of milk powders are typically dependent upon powder composition, the influence of processing conditions prior to drying and drying conditions themselves. The major components of milk powder (proteins, lactose, milkfat) affect the way in which milk powders perform and its suitability for each type of application (figure 2).





U.S. Milk Powder

Usage Applications and Nutrition

Wide-Ranging Usage Applications

U.S. milk powders are an integral ingredient in a wide variety of food and beverage formulations including dairy and recombined milk products, nutritional products, baked goods, confections, beverages, prepared foods, sauces, soups, dressings and more. Recombined milk products produced from WMP or SMP account for the largest share of milk powder usage worldwide. Recombined products can be sold as liquid ultra-high-temperature (UHT) milk, or further processed into sweetened condensed milks or bases for the manufacture of yogurt and frozen desserts, just to name a few uses.

In baked goods, milk powder improves texture to create a moister product, enhances flavor during baking and heating, and accentuates color development. In beverages, milk powder can increase viscosity, help maintain foam stability, and provide creamy dairy notes. In confections, milk powder acts as an emulsifying ingredient, contributes to a smooth texture and rich, creamy flavor, and helps develop color via the Maillard browning reaction.

Milk powders are used by product developers in a number of nutritional products for consumers across life stages. While the majority of infant formulas are whey-based, milk powder is utilized widely in nutritional formulations for older babies and toddlers, often referred to as follow-on formula and growing-up milk. Milk powder can also be used as an ingredient in other nutritional products for adults and seniors. Milk powders are also incorporated into food assistance programs. It is used in ready-to-use therapeutic and supplementary foods as well as fortified blended foods.



Health and Nutrition

U.S. milk powders are a valued source of nutrients and high-quality protein in food and beverage applications. Milk powders are high in soluble vitamins and minerals, including calcium, phosphorus, and magnesium, and can be used to fortify a wide range of products - just 100g of skim milk powder contains 1,300mg of calcium. They are a complete source of high-quality protein, with the amino acids readily digestible and bioavailable. Milk powders also contribute to a positive health halo and a clean ingredient label. ■



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To learn more and find a USDEC representative near you, go to ThinkUSAdairy.org/global-presence.



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