This comprehensive report is based on in-depth interviews with food companies completed by a desk review.
It provides for DECISION MAKERS a global understanding of the sector as well as an outlook on its future.

MARKET ANALYSIS
Trends & Perspectives
Sales and Production by Country
Ingredient category
Trade Statistics
Suppliers
Users

APPLICATIONS
Dairy products & Ice creams
Infant formula
Dietetic & Sport & Slimming foods
Beverages
Confectionery & Chocolate
Bakery, Biscuits, Snacks
Meat, ready-to-eat food
Clinical Nutrition

COUNTRIES COVERED
North America
South America
Europe
Asia
Australia
New Zealand

INGREDIENTS COVERED
WPC
WPI
Hydrolysates
High Gel proteins
Heat Stable WPC
WPC enriched, alpha-lactalbumin

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WHEY PROTEIN INGREDIENT MARKET

OBJECTIVES

INTRODUCTION

Whey proteins are the group of milk proteins that remain soluble in whey after precipitation of caseins at pH 4.6 and 20°C. Whey proteins represent the major proteins in human (breast) milk, in contrast to that of cow’s milk where casein is the major protein. The whey protein is a heterogeneous grouping of several dissimilar proteins: l-lactalbumin, -lactoglobulin, immunoglobulin, lactoferrin, lactoperoxidase, immunoglobulins, proteases peptone, etc. It contains lactose, minerals and lipids. Whey is the watery portion obtained from cheese manufacturing. It is called “sweet whey” (pH greater than or equal to 5.6) if it comes from rennet-coagulated cheese manufactures or “acid” whey (pH less than or equal to 5.1) if it originates from cottage-cheese manufactures. Whey proteins can perform a number of technical functions in food products. They possess solubility over a wide pH range, even near their iso-electric point, create viscosity through water-binding, form gels, emulsify, bind fat, facilitate whipping, foaming and aeration, enhance color, flavor and texture, and bring with them numerous nutritional advantages. Whey proteins can usefully replace or supplement meat proteins, soy proteins products, modified starches and hydrocolloids gums in processed meats. In their native state, whey proteins are highly soluble and adeptly perform emulsification and whipping functions in a food application. They have no flavor on their own and are compatible with cooked meat flavor and spice/seasoning blends.

Their capacity of water-binding make possible to improve cook yield and to have a positive economic impact. They give firmness texture and facilitate retention of moisture during process and cooking. For example, high solubility over a wide range of pH makes WPCs a good candidate for a sport beverage or meal-replacement beverage. In baked goods, whey proteins are used to enhance crust browning, bread flavor and crumb structure. They can retard staling. The use of whey proteins is specially interesting in acid food products like beverages. They provide a high solubility in a large wide pH range, a high dispersibility and good suspension stability. They impart a smooth mouthfeel and are bland of flavor. They can emulsify fat-containing beverages and aerate shake-type drinks and impart a low viscosity useful in dietary product or convalescent food. Finally, they provide an economical source of high-nutritional-quality proteins which makes them particularly useful in sports nutrition: They have an excellent metabolic efficiency and are easily digested. They have the highest concentration of branched chain amino-acids (BCAAs), are a good source of sulphur-containing amino-acids that maintains antioxidant levels in the body, contain glutamine and high levels of arginine and lysine that may stimulate growth hormone release and an increase in muscle mass.
WHEY PROTEIN INGREDIENT MARKET

MARKET APPLICATIONS

**WPC 34**

There will be development of 34 WPC powders in order to enhance their gellifying functionalities which will allow their use in more sophisticated products. Ranges will also be larger, and the market more segmented. For instance, extrusion processing is used to modify the physical texture of whey proteins, expanding their potential use in snack foods and meat products. WPC powders can respond to the growing demand in the food industry for texturing and gelling agents. They are also a substitute for more expensive milk ingredients, in ice-cream for example. The image of milk proteins has remained very good despite the promotional efforts of the soy protein industry. It has been demonstrated that humans need an amino acid source from animal origin. The protein balance in animal origin protein is better than that in vegetable protein.

WPC volumes in food uses are likely to rise further. Obviously overall growth will be fairly small, and the main trend will be moves to add value, both in product variants, and in higher protein levels.

**WPC 75-80**

Mainstream food use will be as important for these products as the more specialised uses listed in the study. More high value food products will switch partly (and slowly) into WPI type proteins, but re-formulation will cause significant practical delay. Overall this sector will show good growth.

**WPC 80%**

WPC 80% can be used in most processed food applications. Utilized in sport nutrition, energy bars, baby formulas, ice cream, dry mixes, condensed milk products and many other processed foods, the product is produced from pasteurized and skimmed sweet whey by ultrafiltration and spray drying.

**WPC 90 (WPI)**

WPI is mainly used in sports food and clinical nutrition, two growing markets. In sports food, the price remains an important buying criterion. This is less the case for clinical nutrition. Re-formulation of products will be very slow as usual.

WPI also has applications for its texturing properties in the food industry.

**PROCESS**

WPC is typically produced using an ultrafiltration process. After the ultrafiltration process, the concentrated liquid whey passes through an evaporator and a spray dryer to remove all but 4-5 percent of the water. WPC is often referred to in conjunction with its level of protein concentration. The processing method of choice is commercial-scale ultrafiltration and diafiltration with semipermeable membranes. These have molecular weight cut-off limits of 10 to 50 KD for fractionating whey protein from the low-molecular-weight compounds such as lactose, minerals, non-protein nitrogen and vitamins. Unless it is pre-treated, a WPC will contain almost all protein components of whey. Products with over 70% protein offer the highest concentration of proteins with the potential for biological activities. Food scientists agree that to maximize this functionality as a food ingredient, the proteins should receive minimal denaturation, which implies as little heat treatment as possible during processing.
The change in ingredient demand, particularly for specialised whey products, can be linked to the explosion of some segments such as healthy foods in some parts of the world. The demand for whey derivatives can also be linked to increased consumption of specialised products such as infant formula, in the last few years. Some countries have developed high quality techniques to obtain specialised whey products from the whey, and therefore play a leading role in world trade of those products, while other countries are far behind and play a much smaller part in these markets.

The world’s processed food market is valued at over two trillion USD and is broadly divided between North America, Western Europe and the rest of the world. Not only it is by far % the largest consumer market, but is growing in real terms by 5-7% owing to the 15% and above growth rates currently recorded in many Asian countries.

With their growing middle classes and young populations, Asia and Latin America represent the most attractive markets. Populations in these areas are increasing more rapidly than in Western countries and people in these countries will spend a larger proportion of their income on food.

The competition is becoming more sophisticated and products more specialized and differentiated. Ignoring any cultural culinary differences, there are two main trends emerging in changes in food taste in developed countries.

Increase in consumption of prepared, frozen, vacuum- or controlled atmosphere-packed foods (convenience food). The main characteristics of these very high added value products are the quality of the preservation and presentation, and their speed of preparation (using, for example, microwave ovens).

An ever-increasing attraction towards natural products. The rediscovery or reinvention of so-called forgotten tangs of the soils, as well as the "biological/organic products, especially in Northern Europe.
COMPANY PROFILE EXAMPLE

OBJECTIVES

MARKET

Consumer Trends
Volumes & Values per country
Evaluation of each segments
Price of ingredients
Market shares

MANUFACTURERS

Production volume
Product Portfolio
Specifications

USERS

Volumes of ingredients
Purchased
Expectations towards new Ingredients

Company presentation

The company specializes in most types of bars, drinking chocolate, chocolate spread and other chocolate confectionery. In addition, they manufacture private label products for the most quality-conscious retailers.

Ingredients used

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<td>WPC/WPI</td>
<td>Good protein source</td>
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<td>A good texturing agent</td>
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<td></td>
<td>Can be active on sleep (tryptophan of the α-lactalbumin)</td>
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<td>Anti obesity</td>
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<td>CLA</td>
<td>(Conjugated linoleic acid)</td>
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Expectations

The company is awaiting new texturizing agents which are above all reliable and at a competitive price, and are also awaiting changes in regulations. Milk proteins are good emulsifiers, and are especially useful for stabilizer-free formulae. Lacto-replacers are used as milk substitutes on the grounds of cost. The serum balance (soluble proteins/emulsifiers) is currently being experimented. The company's products usually have a protein content of around 35% (caseins, whey) and a lactose content of 65%, although the required protein content is in fact between 15 and 25%. A product midway between a lacto-replacer and an emulsifier has been tried for sugar-free ice creams in 1 to 2% doses. All low fat formulae have been abandoned as these do not correspond to what consumers are looking for.
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