International Whey Market Overview

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- Strategy and business development for all elements of the food value chain
- Key competences within functional foods, health & wellness and ingredients
- Core structure - global network
Whey products universe

Added-value level

Whey raw material
- Cheese whey
- Casein whey

Whey I
- Whey powder
- DWP
- WPC35
- Lactose
- Permeate powder
- Dairy ingredient blends
- Functional proteins

Whey II
- WPC80
- Minerals
- Calcium
- Others
- Lactose-pharma grade

Whey III
- WPI
- WPH
- Protein fractions
- Lactoferrin
- Lactoperoxidase
- Alpha-lactalbumin
- Beta-lactoglobulin
- IgG
- Osteopontin

Applications:
- Pharma
- Nutrition
- Health care
- Personal care
- Food
- Feed

Lactose derivatives
- Galactose
- Lactulose
- Lactitol
- Lactobionic acid
- GOS
- Lactosucrose
- Sialyllactose
- Tagatose
Global overview of whey resulting from cheese and casein production

Global production of liquid whey from cheese and casein amounted to 186 million MT in 2008. Annual average growth of ~2% between '02 & '08

Rate of exploitation continues to increase - casein whey share approx. 5%

The EU and US produce ~70% of whey in the world

Source: 3A Business Consulting
Introduction
Whey market overview
Lactose market overview
NPD overview
Market dynamics & outlook
The global whey protein market was worth roughly USD 3.8 billion in 2008.

Between ‘05-'08, market volume up 3% and market value up by 24%.
Global market share and growth rates of the major whey ingredients in 2008

- Volume of approx. 770,000 MT
- Total annual growth of approx. 6% between 2005 and 2008
- High value-added ingredients have seen the largest growth
Global overview of major whey markets in 2008

- The major whey producers - the EU and the US - are also the major markets for whey products followed by China and Canada.
- In ROW, Asian countries represent a major market. Mexico, some South American countries as well as Russia are clearly emerging markets.

Note: Global overview of major whey markets includes the following products: DWP, WPC35, WPC80, WPI and WPH.

Total market ~770,000 MT
Global whey trade volume overview in 2008

Export / import approx. 1,010,000 MT

- Whey trade has grown from approx. 860,000 MT in 2005 to more than 1,010,000 MT in 2008, corresponding to an annual growth of 5-6%
- US and EU accounting for approx. 80% of global trade
- Large export from the West to the East including China, Mexico and Russia
- In the East, Japan, Korea, Thailand and Indonesia are major whey importers
US example: Usage of WP, WPC and WPI in major end-use sectors in 2008

- **Food consumption**
  - **WP:** Approx. 190,000 MT
  - **WPC:** Approx. 85,000 MT
  - **WPI:** Approx. 14,500 MT

*Source: 3A Business Consulting*
6,553 new products were launched containing whey in 2008

Number of new products launched has grown on average by approx. 15% p.a. from 2002 to 2008

Reduced/stagnant NPD activity in 2008 vs. 2006 in US and EU

Source: Mintel, 2008
USA No.1 – launched 994 new products containing whey in these top five categories in ‘08

Source: Mintel, 2008
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In 2008, the global lactose market was worth roughly USD 1.5 billion.

Between ‘05-’08, market volume up 8% and market value up by 25%.

Source: 3A Business Consulting
Global market share and growth rates of lactose, permeate and derivatives in 2008

Volume approx. 1,652,000 MT

Total market volume growth 2005-08: CAGR 8%
Global overview of major lactose markets in 2008

- EU is the biggest lactose market in the world with more than a third of the world lactose consumption followed by US

- Asian countries such as Japan, Malaysia, China and Thailand are among the larger lactose markets with lactose consumption from 30–90,000 MT per country. Emerging markets are found a.o. in South America

Total market approx. 885,000 MT
World lactose trade expands steadily. From 2005 to 2008, lactose trade has grown from 345,000 MT to 383,000 MT, corresponding to a 3-4% growth rate annually with US and EU-25 as the leading lactose exporters.

Lactose is mainly imported by Asian and South American countries. Japan is a key importer with more than 80,000 MT followed by Malaysia and China.
New products launched with lactose per region between 2002 and 2008

- 4,612 new products were launched containing lactose in 2008
- Number of new products launched has grown on average by 13% p.a. from 2002 to 2008
- Reduced NPD activity in 2008 vs. 2006 in US and EU opposite Asia-Pacific

Source: Mintel, 2008
New products launched with lactose: Top 5 countries vs. top 5 sectors in 2008

- Japan No.1 – launched 665 new products containing lactose in these top 5 categories in ‘08
  Source: Mintel, 2008
US example: Usage of lactose in major end-use sectors in 2008

Size of blue circles indicates market size

- Infant formula: High consumption (~250,000 MT)
- Confectionery: Low consumption
- All other uses: Low consumption
- Nutraceuticals incl. pharma: Low consumption

Source: 3A Business Consulting
1. Introduction
2. Whey market overview
3. Lactose market overview
4. NPD overview
5. Market dynamics & outlook
NPD is vital to sustain product sales and growth

- From the manufacturers’ perspective, new product development remains an essential driving force in sales and growth.
- 50% of consumer product sales growth over the past 10 years came from new products (TNS World Panel, 2008).
- The use of whey and lactose ingredients both in the processed food and nutritional sectors continues to drive demand.
Several key end-user sectors are likely to impact upon the whey and lactose market

- **Sports nutrition**: Expected to grow from approx. USD 23 billion in 2007 to approx. USD 32 billion by 2011
- **Functional beverages**: H&W driving demand in sports nutrition, satiety and meal replacement beverages
- **Infant formula**: Increasing volumes of whey to be used to mimic human milk. Estimated growth in Chinese market from approx. 300,000MT in 2007 to 1,000,000 MT in 2012
- **Snack bars**: Market alone worth USD 7.8 billion in 2007, of which - functional bars account for 1/3 of this
- **Other key areas** include weight management, clinical nutrition targeting ageing and immune system, and other personal care products
In terms of volume and value whey is *the* most important protein ingredients in sports nutrition.

Global market worth USD 25 bio in 2008 – 7% avg. growth p.a. ’05-’08

Approx. 75% of the sports nutrition market is comprised of beverages and bars.

Continued growth in market will drive demand for high-protein whey ingredients e.g. WPI/WPH.

**New promising NPD: Sports nutrition**

- **Forward Foods, USA**
  - Contains WPC & WPI
  - Released 2008

- **DC Nutrition, USA**
  - Contains WPI
  - Released 2008
New promising NPD: Functional beverages

- Global trend toward health and wellness driving demand
- Important for beverage co’s to diversify from mature markets
- Market worth approx. USD 60 bio in 2008 – average growth 9% ’05-08 p.a.
- Whey’s high protein, low-fat content, BCAA mix and bland taste make it attractive to the beverage industry

Wakefern Food, USA
Released 2008
Contains WPC and MPC

Next Proteins, USA
Released 2008
Contains WPI
Estimated that by 2015 over 3 billion people will be overweight/obese
US and EU market for dietary products estimated at over USD 100 bio in 2008
Consumers want appetite management NOT calorie restriction
Whey proteins are a key ingredient in satiety products

Kellog’s, USA
Released 2009
Contains 5 g of WPI

Melaleuca, USA
Contains WPI
Released 2008
Comparing year-end production (’07-’08) of all whey products, EU production rose by approx. 1% in the EU, while it remained steady at ±0% in the US.
End February 2009:

- US stocks approx. +10% compared to ’08, however declining trend
- EU stocks are approx. 0% change compared to ’08, declining trend since August ‘08
Whey and dairy ingredients have seen dramatic price volatility during the last 2-3 years.

The dramatic fluctuations which occurred between 2007 and 2008 resulted from supply and demand imbalances.

Whey ingredient prices seem to be increasing slightly after hitting rock-bottom.

Source: Wisconsin University & 3A Business Consulting
Global milk production is on its way down. If not direct reduction then only minor increases compared to the last few years. As such, production and supply of milk ingredients will be reduced, indirectly benefiting the whey ingredients manufacturers. Most demand drivers for whey are in place - once global economic growth returns in 2010 demand will return. Market share lost will slowly return given the current relatively low prices and more importantly the changing psychology of the market. 2009 outlook is for a slight increase in both demand and prices, longer term trend is also positive.
The market for whey & lactose ingredients will continue to grow both in food and nutrition applications.

- Permeate may well represent biggest industry challenge ahead.

*Note: Excludes WP

**Volume estimations: 2008-2011**

- Market size 2011:
  - Whey*: ~923,000 MT
  - Lactose: ~1,630,000 MT

- CAGR: ~6%
- CAGR: ~5%
Forerunner casein/caseinate was challenged by whey proteins, now both face competition from milk proteins.

- MPC (42-85%/MPI) has grown on average p.a. by 17% between '05 to '08. If this continues by 2011 MPC/MPI will overtake casein/caseinate production.
- Casein/caseinate has declined by approx. 3% p.a. between '05 and '08.
- WPC80/WPI has grown by ~20% p.a. over the period shown.

Source: 3A Business Consulting
3A multi-client reports

Current publications

OCTOBER 2008
3A Business Consulting

MARCH 2009
3A Business Consulting

Includes:
- SMP/WMP
- Casein/caseinates
- MPC/MPI
- Peptides
- Milk permeate
- Milk minerals
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