

# Arla Foods Ingredients

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Only the best for  
**our youngest  
customers – high  
quality lactose**

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A look at formula  
essentials

# Quality starts here

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**Whey-less cream cheese  
provides 100% yield**

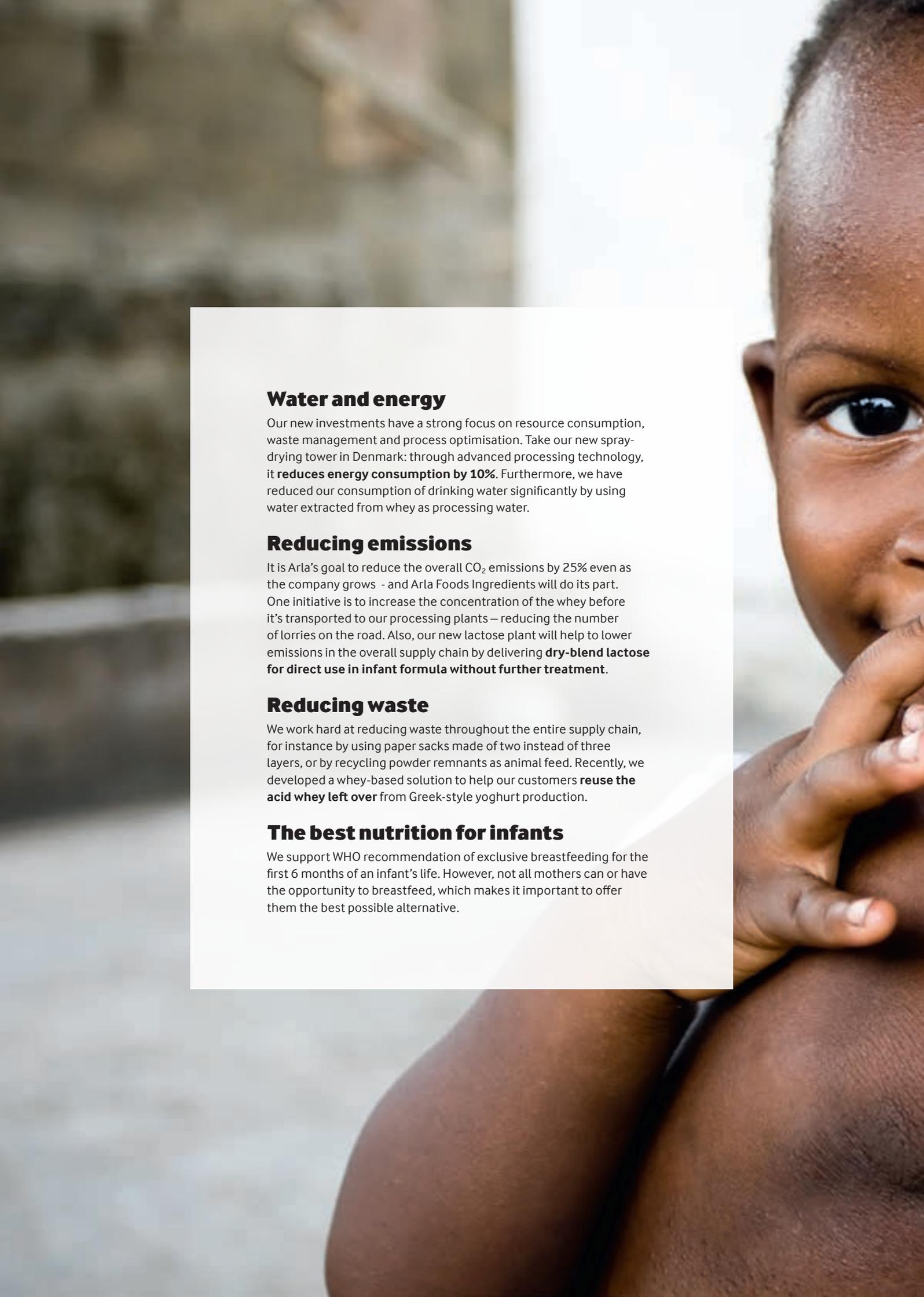
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The short cut to low cost Greek  
yoghurt

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**Want fast  
recovery for  
athletes?  
No sweat!**





## Water and energy

Our new investments have a strong focus on resource consumption, waste management and process optimisation. Take our new spray-drying tower in Denmark: through advanced processing technology, it **reduces energy consumption by 10%**. Furthermore, we have reduced our consumption of drinking water significantly by using water extracted from whey as processing water.

## Reducing emissions

It is Arla's goal to reduce the overall CO<sub>2</sub> emissions by 25% even as the company grows - and Arla Foods Ingredients will do its part. One initiative is to increase the concentration of the whey before it's transported to our processing plants – reducing the number of lorries on the road. Also, our new lactose plant will help to lower emissions in the overall supply chain by delivering **dry-blend lactose for direct use in infant formula without further treatment**.

## Reducing waste

We work hard at reducing waste throughout the entire supply chain, for instance by using paper sacks made of two instead of three layers, or by recycling powder remnants as animal feed. Recently, we developed a whey-based solution to help our customers **reuse the acid whey left over** from Greek-style yoghurt production.

## The best nutrition for infants

We support WHO recommendation of exclusive breastfeeding for the first 6 months of an infant's life. However, not all mothers can or have the opportunity to breastfeed, which makes it important to offer them the best possible alternative.



# Global reach **Global responsibility**

As a citizen of the world, one of our main objectives is to secure a responsible supply chain and assist you in meeting the expectations of your stakeholders. Following the principles of the Arla Foods code of conduct, we have pledged to run our company according to high ethical, social, quality and environmental standards – a commitment that extends all the way from farm to fork.

## **Affordable nutrition for undernourished children**

Over the past years, it has become widely recognised that the corn and soy based food products given to undernourished children are inadequate. Through donations and research, we support a project that investigates new forms of affordable and effective food aid for the 36 million undernourished children in developing countries.

*The research project is initiated by the University of Copenhagen and backed by the Danish International Development Agency (Danida).*

A close-up portrait of Henrik Andresen, CEO of Arla Foods Ingredients. He is a middle-aged man with short, light-colored hair, smiling warmly at the camera. He is wearing a dark blue blazer over a light-colored, button-down shirt. The background is plain white.

# What is **quality**?

At **Arla Foods Ingredients**, we recently held a number of workshops with **customers** to find out what mattered most to them. Above all, their priority was the availability of ingredients at the right quality. That was a priority we could wholeheartedly relate to.

But what is the right quality? Quality is not just one thing we do – it is the sum of many things. For us, is the combination of the best raw materials, a uniform and high quality end product, adequate capacity, a tight logistic set-up and the right documentation at all times.

**Quality starts here** is our commitment to deliver quality within all parameters of the business relationship. By building on what has already made Arla Foods Ingredients a **leading supplier of whey-based ingredient solutions**, we want to keep pushing the boundaries for what is possible and create products that meet ever-changing market demands and at the same time build even stronger relationships with our customers.

Read on to find out how we do that and how our product programme can help you push the boundaries for your products. Quality starts here.

**Henrik Andresen**, CEO

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### **100% security of supply**

As demand grows, we grow. Our global set-up keeps your production running smoothly. We have the production capacity and logistical network to meet any demand, anywhere in the world.

### **Full commitment to the environment**

We apply sustainable principles in every part of our production and distribution. But sustainability is a journey that never ends and we continuously improve our efforts.

### **Dedication and expertise**

A global set-up of deeply committed experts makes sure that no challenge is left unsolved and provides our customers with the most qualified partners possible. Our expertise is at your disposal.

### **Innovative, customised solutions with a fast time to market**

Research and development fuels our business. Our experts work tirelessly to innovate new functionalities, and at our unique application centres we can mirror your production set-up to tee, allowing for thorough application trials.

### **Uniform and high product quality**

There are no surprises with our ingredients. State-of-the art equipment and leading product and application experts ensure uniform high quality in every delivery. Consistency guaranteed.



# Quality comes naturally

Innovative ingredients, world-class facilities, dedicated experts. **Quality starts here.**

The best starting point for a high-quality end product is high quality ingredients. At Arla Foods Ingredients, **we innovate whey-based solutions to match any business challenge** you might have, whether it's optimising your existing product range or developing new ones.

Our recipe is simple. Take innovative ingredients derived exclusively from 100% natural milk-based whey. Mix with dedicated expertise and tireless commitment to research. Finally, add state-of-the-art facilities for production, R&D and product trials and you'll know why we say 'Quality starts here'.



“What is **truly unique** about Arla Foods Ingredients is that we have the **best people** in the business working with the **highest quality products** and the most advanced processes”

Brian Petersen, Category Director



**Baby,**  
our most  
**important**  
**customer**

The most fragile consumers deserve the best care. Our **infant nutrition products** are specifically designed by our highly skilled and dedicated paediatric department to close the gap between **breast milk and formula milk.\***

\*Using infant formulas is second to breastfeeding, a fact supported by WHO. This information is for professional use only.



## PARTNER UP!

Our staff of infant nutrition scientists is your entry ticket to in-depth knowledge about whey ingredients, documentation and infant nutrition. Whether you need specialist knowledge to engage in a healthy discussion or advanced clinical studies, we can deliver.

### Alpha-lactalbumin

#### The formula essentials

Looking for a way to come as close to human milk as possible? We've got it. Alpha-lactalbumin is the dominant protein in human milk and is uniquely rich in essential amino acids. Our alpha-lactalbumin solutions are called Lacprodan® Alpha-10 and Lacprodan® Alpha-20. Adding alpha-lactalbumin to infant formula allows a reduction of the protein content, while still being compliant with amino acid levels set by regulation. The lower protein levels mean that the formula comes closer to human milk in terms of protein concentration. Moreover, alpha-lactalbumin enriched formula offers a higher degree of comfort for the infant.

We are currently working on a new clinical study to document the effects of alpha-lactalbumin in infant nutrition in even more detail.

### FUNCTIONAL EFFECTS

- > Reduces protein content in formula and thus reduces risk of obesity in infancy and later
- > Increases gastro-intestinal comfort
- > Improves digestion

### PRODUCT FACTS

#### Lacprodan® Alpha-10 & Lacprodan® Alpha-20

- > Increased levels of alpha-lactalbumin
- > Very high levels of essential amino acids
- > High in cysteine and tryptophan

### Osteopontin

#### The immune specialist

The whey protein osteopontin may be one of the **missing links** in the quest to bringing bovine milk as close as possible to human milk. While human milk contains relatively high amounts of osteopontin, bovine milk contains only small amounts. That means infants who rely on formula milk get less than breast-fed infants.

Studies show that osteopontin plays an important role in the development of immune functions in infants, so at Arla Foods Ingredients, we made it our mission to find a method to process whey in a way that would concentrate the very small amounts of this protein and make it available for use in infant formula.

**We succeeded, and the result is Lacprodan® OPN-10** which is osteopontin in an 89% pure form – and the first osteopontin product on the market.

At Arla Foods Ingredients we hold the intellectual property rights to the processing and application of osteopontin within infant formula.

### FUNCTIONAL EFFECTS

- > Supports the immune development of infants

### PRODUCT FACTS

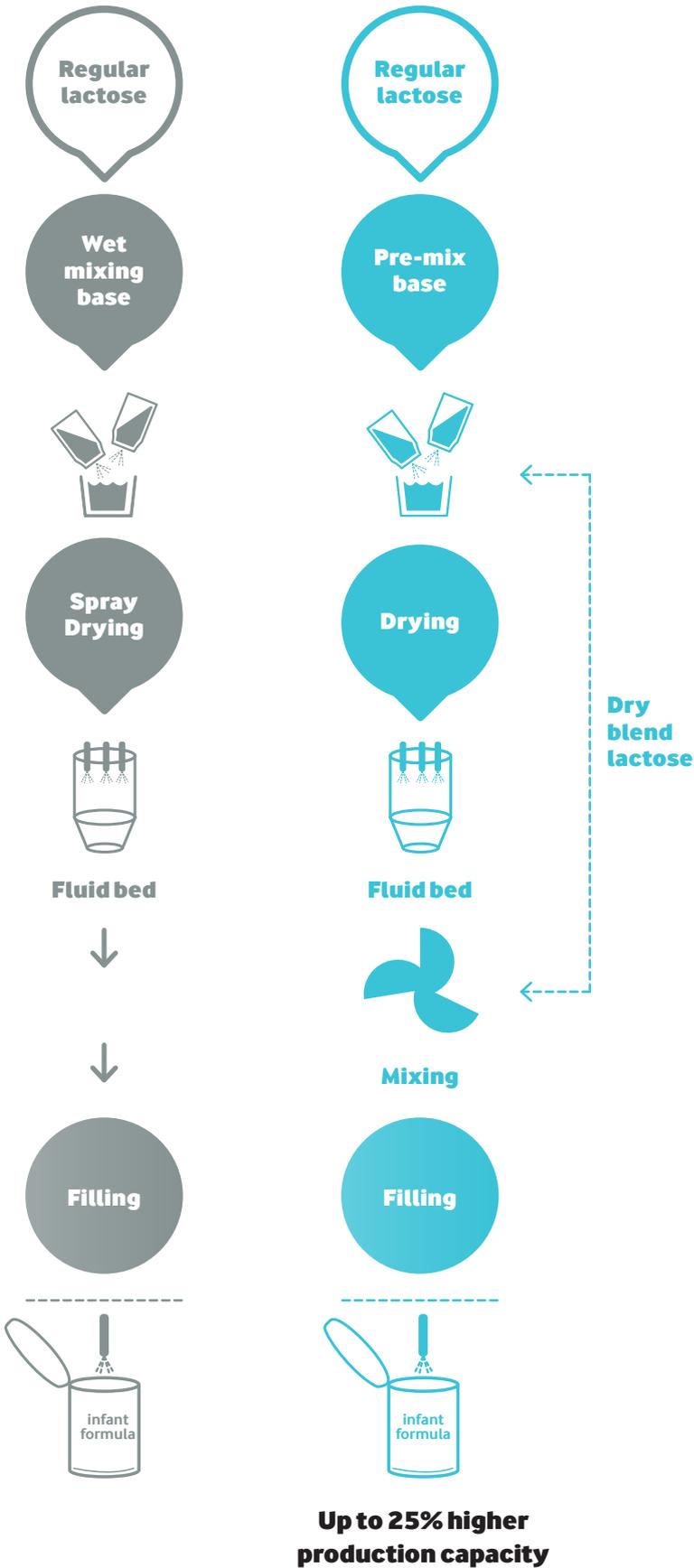
#### Lacprodan® OPN-10

- > A heavily phosphorylated and acid glycoprotein with strong calcium-binding properties

A large, polished stainless steel industrial mixing tank is the central focus, situated in a clean, brightly lit factory environment. The tank is cylindrical with a conical bottom and is surrounded by a complex network of pipes, walkways, and railings. The background shows other industrial equipment and a high ceiling with recessed lighting. The overall scene conveys a sense of precision and scale in a manufacturing facility.

# Keep **your** **powder** dry

Take on a **booming infant formula** market with high-quality dry-blend lactose.



### Demand the highest quality lactose

With rapidly increasing birth rates in Asia and more women entering the labour market globally, **infant formula has become the fastest rising segment in the food industry**; demands are expected to increase by +50 MT p.a., but lactose that lives up to the strict quality requirements and comes with security of supply is hard to find.

At our production facilities in Denmark and Germany, we specialise in producing quality dry-blend lactose with high purity, full control of sourcing materials and excellent powder properties. With our new 120 million Euro state-of-the-art lactose plant underway, we can meet any demand and help you.

### Achieve higher production capacity

By adding your dry blend lactose to your base powder at a later stage in the production process you may increase capacity by up to 25%.

### Achieve economy of scale

The final product can be mixed at a local facility for cost efficient utilization of production sites.

### Increase product quality

By adding up to 3% dry blend lactose to your final powder mix you may improve:

- > Powder properties (for better solubility)
- > Dispersability (for easy mixing)

Our high quality lactose is also your guarantee of:

- > Compliance with requirements for dry blend infant ingredients
- > High purity and uniform chemical composition
- > Extended monitoring programme for process hygiene indicators
- > Fine and uniform particle size distribution and excellent powder properties
- > Protected and “easy open” packaging

Increased production capacity in infant formulas by adding dry blend lactose



# Pure muscle **power**

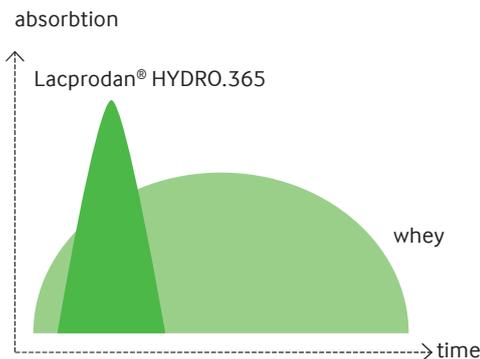
Speed up recovery time for athletes and join  
the **high protein beverage** movement.  
Meet our solutions within **health and  
performance**.



**WHEY PROTEIN HYDROLYSATE**

**Great tasting, fast recovery for athletes**

Meet your customers' demand for protein based sports nutrition with Lacprodan® HYDRO.365 – **a true breakthrough in whey protein**. This whey hydrolysate is developed to speed up the recovery time for serious athletes, and it does so without providing the sensation of astringency that other high protein products have. Lacprodan® HYDRO.365 offers quick digestion and ultra-rapid absorption of amino acids. It simply **restores peak power** and eliminates muscle soreness within as little as six hours after hard exercise. And the really good news? It can be used in clear ready-to-drink sports beverages as well as bars, powders, gels and tablets.



**FUNCTIONAL EFFECTS**

- > **Advanced insulinotropic effects**
- > **Fast muscle glycogen replenishment**
- > **Increase in plasma BCAA concentrations**

**PRODUCT FACTS**

- > **Easy to incorporate at up to 40 g of protein per 100 ml into beverages, bars, gels and as powder**
- > **UHT stable**
- > **PH flexible**
- > **Neutral taste**

**WHEY PROTEIN ISOLATE**

**Build the soft drink of the future. Super high protein – ready to drink**

Introducing the ingredient that will bring soft drinks up to speed with the growing trend of high-protein drinks. Our whey protein isolate contains 90% protein and only 0,2% fat and lactose and **works perfectly in clear drinks** – in other words, it's a winning combination. Great for clinical nutrition, functional foods and sports nutrition where high protein, low fat and low lactose is the goal.

**PRODUCT FACTS**

- > **At least 90% protein**
- > **0.2% fat**
- > **0.2-0.5% lactose**
- > **Clear in solution**
- > **Stable at high temperatures**

**PKU SUPPLEMENT**

**Award-winning concept improves quality of life – bite by bite**

For those suffering from phenylketonuria, (PKU), getting their daily nutritional needs covered is an on-going battle. Unable to process protein metabolically, they are forced on a life-long diet that leaves little room for spontaneity. For this group, it is essential that their diet is supplemented with synthetically produced amino acids to make up for the protein that they cannot get through their meals – and in a not so distant past, this meant poorly tasting supplements that were hard to digest.

**Today, that has changed.** With Arla Foods Ingredients' ground-breaking and award-winning Casein glycomacropeptide (CGMP), PKU patients can now enjoy better tasting supplements that are more easily digested, and that come in the form of desserts, protein bars and other delicious products.



# Tasty **dairy** **temptations**

**Our dairy offerings** include fast  
slow-ripening cheese as well as creamy  
yoghurts and cream cheeses. **Enjoy!**



## WASTE-FREE SOLUTIONS

### Whey-less cream cheese

Maybe you face some of the challenges of classic cream cheese production: You need very large milk and cream volumes, expensive equipment, and you have to handle large volumes of the by-product acid whey. Our whey-less cream cheese solution eliminates your worries instantly:

- > Milk usage is reduced by up to 70%
- > 100% yield and increased capacity on your production line
- > No handling of acid whey or permeate
- > All natural end product without syneresis

### Greek yoghurt without acid whey

Greek yoghurt production usually results in large amounts of acid whey, regarded as a waste product by many. Our Nutrilac® proteins turn your excess acid whey into tasty dairy products with a sustainable and eco-friendly profile. Start looking at acid whey as a raw material instead of waste!

## FASTRIBE FOR TRADITIONAL CHEESE

### Speed up your slow-ripening cheese

Traditional cheeses have distinctive characteristics when it comes to taste, texture and appearance, and these characteristics take time to develop – anywhere from a few weeks to several months or even years. That means expensive storage time for the cheese producers.

Arla Foods Ingredients now offer a simple solution for reducing the ripening time of your cheese. Simply add our functional milk protein Nutrilac® FastRipe to the cheese milk, and follow your usual cheese-making process. The functional milk proteins will speed up the ripening time of your cheese without affecting its final flavour, texture or shelf life. Your cheese will be ready for sale weeks earlier than otherwise. **Ready to move fast?**

## PROTEINS FOR FAT REDUCTION IN CHEESE

### Delicious and low-fat

Venture into low-fat territory and try our **protein solutions for fat-reduced cheese products** like yellow cheese, feta cheese and mozzarella. Our solution eliminates the common challenges in low-fat cheeses, like hard, rubbery texture, an unappealing appearance and a much lower than yield than in full fat cheese production.

## HIGH PROTEIN SPOONABLE PRODUCTS

### The smooth softness of high-protein yoghurt

Increase the protein content of your yoghurt and keep delicious texture and taste. Our protein products for yoghurt production allow you to tap into the high-protein trend with products that are as palatable as their low-protein counterparts.

## LOW-COST GREEK-STYLE YOGHURT

### The short cut to Greek-style yoghurt

Make Greek-style yoghurt without investing in expensive equipment and without the costs of low yield. Our **quick process products** reduce production costs significantly for Greek-style yogurt and eliminate the need for both specialized production facilities and whey separation. The result? **Cost effective Greek-style yoghurt** from your usual production facility – whether you are looking to make non-fat, low-fat, full-fat, long-life or drinking yoghurt.



## DRINKABLE YOGHURTS

### It's all smooth sailing from here

The beverage category has never been more innovative – working its way from thirst quencher to functional lifestyle product – appealing to a large, deep-pocketed target group. One of today's most important trends is products high in protein. But adding protein to dairy products is far from trouble-free. Up until now, most attempts have resulted in grainy, sandy textures and a distinctive, unwelcoming taste.

At Arla Foods Ingredients, we have developed a range of high-protein ingredients ideal for drinkable yoghurts, infusing your delicious beverage with **muscle-building nutritional properties and a unique viscosity** without compromising the taste experience. This allows you to compete with the vast soft drink market by offering a range of benefits:

### DELICIOUS AND DRINKABLE

- > A smooth and delicious taste experience
- > A healthy, nutritious alternative to regular soft drinks
- > A meal in-between meals supporting the 'to-go culture' of today



## WHEY PROTEIN CONCENTRATE

### Whip your products into shape

All over the world, health-conscious consumers and athletes are looking for products to support their quest to stay fit, strong and healthy. Lacprodan® DI-7017 is an advanced whey protein for milky drinks that allows you to cater to this need – easily and effectively. With its excellent amino acid composition, **it will optimise muscle build-up after workouts**. Highly satiating, it will be able to replace unhealthy, fattening snacks, as well.

Furthermore, Lacprodan® DI-7017 is ideal for clinical nutrition. In fact, bedbound patients are able to maintain their entire muscle mass for as long as two weeks with a regular intake of Lacprodan® DI-7017 infused beverages.

### THE FULL EFFECT

- > Increases protein content without compromising the taste
- > Improves muscle-building and satiety response mechanisms
- > Offers quicker digestion times compared with casein
- > Highly soluble
- > Long shelf-life
- > Suitable for long range of foods and beverage products

### PRODUCT FACTS

#### Lacprodan® DI-7017

- > 100% whey protein
- > High in branched chain amino acids
- > UHT stable and PH neutral



## HIGH PROTEIN SOLUTIONS

### Indulgence with a clean conscience – Greek-style ice cream

Arla Foods Ingredients now offers a range of functional milk proteins that can boost protein levels in dairy products to as high as 10% – without the dry graininess previously experienced in high-protein products. That means you can make tasty, velvety ice cream with the thick, creaminess of Greek yoghurt and tap into the major consumer trend of low-fat, high-protein products.

## ICE COLD FACTS

- > 100% exchangeable with skimmed milk
- > Can cut production costs
- > Low caloric contents
- > Beneficial bacteria cultures



## IMPROVING PRODUCTS NATURALLY

### Transform the way you bake

Can we interest you in a range of functional milk proteins that can be listed on-pack as simply “Milk protein”? And which will completely transform the way you bake at the same time? Our new toolbox of natural improvement solutions does just that. **Prepare for optimised products**, reduced waste and cleaner labels. All made specifically for bread, cakes, biscuits, cookies and bakery fillings. You will experience benefits like increased shelf-life and improved crumb structure.

## EGG REPLACEMENT

### It's much more than cost reduction

We are known for our high-quality egg replacers that reduce production costs efficiently. But many of our customers aren't aware of the many additional benefits of replacing fresh eggs with functional milk proteins. Did you know that using an egg replacement can actually **improve the customer's experience of taste**, texture and freshness? So by using an egg replacement, you create a genuine win-win situation – your costs go down, and your customer's experience improves.

## PRODUCT FACTS

- > 100% natural
- > Declarable as milk protein or whey protein concentrate
- > Low-fat, low-calorie
- > Up to 20% saving on egg costs
- > 18-month shelf life

# Where the *magic* happens

Every day, our researchers work tirelessly to create new, milk-based ingredients with exciting functional and nutritional benefits tailored to meet your business challenges.

At Arla Foods Ingredients, we live and breathe for presumably unsolvable challenges. So when you approach us with the need for a customised solution, **you light a fire under a whole range of dedicated technicians, engineers and biochemists.**

At our advanced application facilities, we have the equipment and expertise to engineer highly innovative ingredients, some of which are patented or patent-pending. We even offer the possibility to test solutions in a production set-up just like yours, removing the many risks of innovation and dramatically shortening the time to market of your new product.

Now, what  
can **we do**  
**for you?**

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## Take our ingredients for a spin

Want a low fat product to have a richer taste?  
Need longer shelf life for a product? At our  
application centres in Denmark and Argentina,  
we improve your products and processes in  
3 simple steps:

### DEFINE THE CHALLENGE

Whether launching a new product or optimising an existing, our first step is always to define the task at hand, establish a purpose for the process and set up measurable criteria for success.

### DEVELOP THE SOLUTION

Next, we start developing the solution you need. If relevant, customers are invited to join a process of trial-and-taste at our unique application centres. Here we mirror your production in a small-scale environment and test the product to perfection. The result: a technical solution and a commercial proof of concept.

### DEPLOY THE SOLUTION

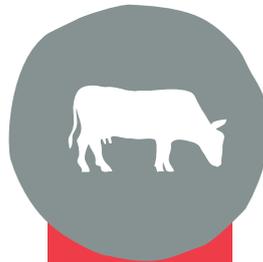
Finally, we test the solution in your production set-up – while our team offers technical and commercial expertise. The output? A validated technical solution, ready for production and commercial launch.

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# From *whey* to **ingredient**

## Milk/whey

Pre-treatment of milk or whey: denaturing, bacterial status, and chemical/compositional changes



## Compose

Creation of the right composition of milk components, primarily by separation techniques, such as membrane filtration: MF, UF, nano, RO, – and chromatography



## Modify

Creation of functionality or nutritional value by enzymatic treatment, controlled denaturation and homogenisation



## Integrate

Concentration of the modified components, primarily by membrane filtration, evaporation and spray drying



## Apply

Application of the modified dried ingredients to obtain nutritional or functional benefits. Chemical and functional analyses are carried out to ensure the desired effect is achieved



## The hard facts

### Applications centres and R&D

- > One application center in Denmark and one in Argentina: 2000 m<sup>2</sup> test facilities for product trials. Simulate large-scale production setups accurately
- > 37 employees in our Danish and Argentinian application centres
- > Advanced R&D facilities in Nr. Vium, Denmark: Focuses on research-based product innovation, developing new ingredients pro-actively
- > 38 scientific employees in our R&D department covering dairy technology, food science, chemical engineering, chemistry, biotechnology
- > 16 lab-, food- and dairy technicians
- > Application centres and R&D cover dairy, bakery, beverage, ice cream as well as products for nutrition and infants



“We combine know-how about **AFI ingredients and food applications** with **in-depth technological insight** to attain solutions that **fit each individual customer perfectly**– and on the way we build strong partnerships. I haven’t yet met anyone not impressed by working with us.”

Connie Benfeldt,  
Categories & Application Director

# Future supply is secured

To live up to our promise of 100% security of supply, we have recently invested 60 million Euro in a whey processing plant in Denmark. The new spray-drying tower, put into service in 2012, immediately increased our capacity by 80%. Furthermore, we are expanding the facilities with a 120 million Euro state-of-the-art lactose plant. Once operational in 2014, the plant will boost our lactose production by 85,000 metric tonnes, more than doubling our current capacity and allowing you to respond to the rising demand for, e.g., infant formula. **It is our ambition to be present globally to make sure your needs are met.**

## Danmark Protein

Videbæk, Denmark

- > 100% owned by Arla
- > Full range of whey protein and lactose products

## HOCO

Holstebro, Denmark

- > 100% owned by Arla
- > Production of milk calcium and hydrolysates

## Tine Meieri

Jæren and Verdal, Norway

- > Partnership since 2008
- > Outside Norway, Arla is the exclusive distributor of all TINE's whey products

## Arla Foods Ingredients S.A.

Porteña, Pcia. de Cordoba, Argentina

- > 50/50 joint venture between SanCor C.U.L and Arla Foods Ingredients
- > Produces whey protein and permeate powders

## Euroserum

Mâcon, France

- > Partnership since 2011
- > Specialised whey protein and permeate products

## Meadow Foods

Chester, Cheshire, United Kingdom

- > Partnership since 2012
- > Supplies AFI with specialised whey protein

## Biolac KG

Harbarnsen, Germany

- > 50/50 joint venture between MTS and Arla Foods Ingredients
- > Produces whey protein and lactose

## ArNoCo GmbH

Nordhackstedt, Germany

- > 50/50 joint venture between DMK and Arla Foods Ingredients
- > Produces lactose



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