

# MILK LACTOFERRIN FOR NUTRITION AND HEALTH

GEA spray and freeze drying solutions



# MILK LACTOFERRIN

Here at GEA we understand that whether you are an established lactoferrin manufacturer, or are looking into setting up a new lactoferrin processing plant, you will want to select the best technology for the safe, efficient production of high quality lactoferrin. We specialize in configuring fully featured processing plants for small-scale industrial lactoferrin production. Our expertise spans multiple stages, including the critical drying step, as well as CIP, safety and fire extinguishing systems, and automation.

We aim to tailor ideal solutions that will help to maximize lactoferrin powder yield, hygiene and plant operability, and reduce the risk of losing or damaging valuable product.

Specialists at our GEA Test Center in Denmark can work with you to configure the key drying stage, and provide samples for activity and functionality studies that will help to determine the optimum spray drying or freeze drying conditions for generating a lactoferrin powder with the desired characteristics.

Product loss isn't an issue when using freeze-drying technology, and for spray drying setups we can harness our GEA CEE high efficiency cyclones to help minimize the loss of valuable lactoferrin powder.

## A valuable milk component

Lactoferrin is found in both human and bovine milk, and is typically extracted from skim milk or whey. As a multifunctional protein with various biological activities, lactoferrin represents an attractive ingredient for infant milk formula blends, and other nutritional products. The lactoferrin concentration is higher in colostrum (first milk) than in ordinary milk, which is why the protein is especially valued for applications in the infant milk formula market.

Lactoferrin source	Concentration g/litre
Human colostrum	6-8
Bovine colostrum	1.0
Human milk	2-4
Bovine milk	0.2
Bovine liquid cheese whey	0.1

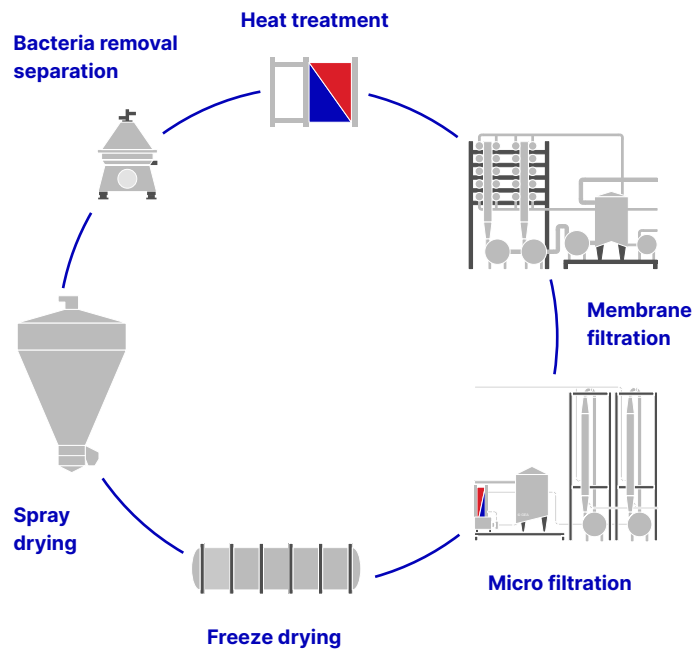
## GEA spray and freeze drying solutions

We have decades of expertise in both spray- and freeze-drying technologies, and can tailor the optimum equipment for your lactoferrin process, scale and plant layout. Lactoferrin activity is heat sensitive, so for spray drying, we recommend single-stage drying with cyclone separation and a powder conveying line for gentle powder cooling. For freeze drying, we recommend batch freeze drying with radiation heating in finned trays, combined with prilling in liquid nitrogen as the freezing method.

## Test facilities

We want our customers to be confident that their plant will produce high yield, high quality lactoferrin, as well as demonstrate optimum efficiency, safety, and hygiene. Our test center in Denmark is there for you to access advice and support from our specialists, trial run GEA equipment and processes, and carry out lactoferrin tests, so working together we can configure the best plant for your needs.

### GEA solutions for lactoferrin powder processing



Studies confirm that spray-drying and freeze-drying technologies do not result in any lactoferrin protein denaturation, so these technologies can be ideal for drying the final lactoferrin powder.



	Freeze dried LF powder	Spray dried LF powder
Water activity	Lower	Higher
Bulk density	Higher	Lower
Color	Darker	Lighter
Solubility	Lower	Higher
LF Denaturation	Nil	Nil
Antioxidant capacity	Lower	Higher

**Source:** Wang, Bo et al: Characteristics of bovine lactoferrin powders produced through spray and freeze drying processes. International Journal of Biological Macromolecules 95(2017) 985-994.

### Examples of GEA plant capacities

	Spray Dryer 1		Spray Dryer 2		Freeze Dryer 1		Freeze Dryer 2	
	18% TS*	25% TS	18% TS	25% TS	18% TS	25% TS	18% TS	25% TS
Feed concentration	18% TS*	25% TS	18% TS	25% TS	18% TS	25% TS	18% TS	25% TS
Feed rate	53 kg/h	50 kg/h	106 kg/h	100 kg/h	19 kg/h	20 kg/h	82 kg/h	90 kg/h
Powder rate	9.9 kg/h	13.0 kg/h	19.8 kg/h	26 kg/h	3.5 kg/h	5.0 kg/h	15 kg/h	23 kg/h

\* TS = Total Solids

**GEA Process Engineering A/S**

Gladsaxevej 305  
2860 Soeborg, Denmark

Tel +45 39 54 54 54  
[gea.com/contact](http://gea.com/contact)