MILK LACTOFERRIN FOR NUTRITION AND HEALTH

GEA spray and freeze drying solutions
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.

<table>
<thead>
<tr>
<th>Lactoferrin source</th>
<th>Concentration g/litre</th>
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<tbody>
<tr>
<td>Human colostrum</td>
<td>6-8</td>
</tr>
<tr>
<td>Bovine colostrum</td>
<td>1.0</td>
</tr>
<tr>
<td>Human milk</td>
<td>2-4</td>
</tr>
<tr>
<td>Bovine milk</td>
<td>0.2</td>
</tr>
<tr>
<td>Bovine liquid cheese whey</td>
<td>0.1</td>
</tr>
</tbody>
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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.
Spray Dryer 1  Spray Dryer 2  Freeze Dryer 1  Freeze Dryer 2
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

Water activity  Lower  Higher
Bulk density  Higher  Lower
Color  Darker  Lighter
Solubility  Lower  Higher
LF Denaturation  Nil  Higher
Antioxidant capacity  Lower  Higher


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.