

# FREEDOM FOODS GROUP NUTRITIONALS

NUTRA**FERRIN**<sup>™</sup>  
LACTOFERRIN PROTEIN AT ITS BEST





# NUTRAFERRIN™ – PROTEIN AT ITS BEST

The Only Lactoferrin Protein Fresh from Cow's Milk that is  
Made in Australia, using State-of-the-Art Manufacturing Capability and  
Multi-stage Low Temperature Spray Drying

牛奶中唯一的新鲜乳铁蛋白是在澳大利亚生产的，  
采用最先进的生产能力和多级低温喷雾干燥





# MAKING FOOD BETTER

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**BUILDING A MAJOR GLOBAL  
NUTRITIONALS COMPANY  
FROM AUSTRALIA**

在澳大利亚建立一家全球主要的营养品公司

FINANCIAL REVIEW BOSS  
MOST INNOVATIVE  
COMPANIES

AUSTRALIA'S BEST  
MANUFACTURING &  
CONSUMER GOODS  
INNOVATION PROGRAM

**freedom** GROUP  
Making food better **FOODS** LIMITED

# OUR SITES



## DAIRY & NUTRITIONALS

### SHEPPARTON

Located in Shepparton, Victoria, Freedom Foods Group is a leading Australian manufacturer of quality long life dairy products, and our Nutritional Ingredient Platform.

We source milk from dairy farms across The Goulburn Valley to deliver only the best dairy products for our consumers.

We produce a wide range of quality dairy products including Dairy Milk (Full Cream, Low Fat, Skim, A2 Protein), Flavoured Milk, Lactose Free Milk and Fortified Milk.

Our new specialised Nutritional Ingredient Platform in Shepparton produces key dairy protein ingredients in powder and liquid formats, allowing us to build our portfolio of specialty nutritional products.

shepparton 生产关键的奶粉和液体蛋白质成分

WE ARE EVER EXPANDING OUR SITES TO CATER FOR ALL ASPECTS OF 'PADDOCK TO PLATE'.



## PLANT BASED & DAIRY BEVERAGES

### INGLEBURN

Our state-of-the-art facility in Ingleburn, New South Wales specialises in the development and manufacturing of UHT plant based beverages.

We are the experts in the development and production of a wide range of plant based beverages that include, but are not limited to; almond, soy, rice, macadamia, coconut and pea milks. We also produce liquid stocks, flavoured beverages, yoghurt drinks and cream.

The site offers a variety of pack and product formats, such as 2L, 1L and 200mL.

我们位于新南威尔士州英格尔本最先进的设施专门从事 uht 植物饮料的开发和生产。我们是开发和生产各种植物饮料的专家，包括但不限于杏仁、大豆、大米、澳洲坚果、椰子和豌豆奶。我们还生产液体饮料、调味饮料、酸奶饮料和奶精。该网站提供各种包装和产品形式，如 2L、1L 和 200毫升。



## CEREAL & SNACKS

### LEETON

Our Leeton site is home to our dedicated 'Free From' facility, producing our iconic allergen-free cereals such as flakes, mueslis and extruded cereals (i.e. puffs, sticks and flakes).

This site ensures not only the highest quality products, but the tightest allergen control process and procedures. These procedures have been embedded over many years, making us the leader in allergen control.

In addition to allergen-free products, we produce bites, popcorn, porridge sachets, paste bars, muesli bars and rice puff bars.

我们的利顿网站是我们专门的“免费”设施的所在地，生产我们标志性的无过敏原的谷物，如薄片，麦片和挤压谷物(即泡芙，棒和薄片)。这个网站不仅确保最高质量的产品，但最严格的过敏原控制过程和程序。这些程序已经深入人心多年，使我们成为过敏原控制领域的领导者。除了不含过敏原的产品，我们还生产叮咬、爆米花、麦片粥包、糊状棒、什锦早餐棒和米粉棒。



## CLUSTERS & MUESLI

### DANDENONG

Our facility in Dandenong, Victoria produces a wide range of innovative, great tasting and high-quality muesli and cluster products. Our team creates and delivers on-trend, healthy and delicious breakfast solutions using a wide variety of ingredients such as oats, nuts, seeds and dried fruits.

我们在丹德农的工厂，维多利亚生产各种创新的，美味的，高品质的牛奶什锦早餐和集群产品。我们的团队使用各种原料，如燕麦、坚果、种子和干果，创造并提供与时俱进的健康美味的早餐解决方案。



## SPORTS NUTRITION & POWDERS

### SYDNEY

The Freedom Foods Group sports nutrition and powder facility has many years of experience in developing high quality nutritional powders for Australian and international markets. Developing some of Australia's most popular sports nutrition products, this site has been engineered to handle both small and large scale production volumes across protein powder, amino acids and diet supplements.

自由食品集团的运动营养和粉末设施有多年的经验，在开发高品质的营养粉为澳大利亚和国际市场。开发一些澳大利亚最受欢迎的运动营养产品，这个网站已经设计处理小规模和大规模生产的蛋白质粉，氨基酸和饮食补充剂。



## INDUSTRIAL FOOD INGREDIENTS

### DARLINGTON POINT

As part of our paddock to plate strategy, Freedom Foods Group is continually integrating our processes to make sure we control the quality and the allergens in all our foods.

Our mill in Darlington Point supplies specialised milled, extruded or flaked allergen-free ingredients, including:

- Gluten-free grains: popping corn, white maize flour, yellow maize flour, yellow maize grits, polenta, rice flour, sorghum flour. These can be supplied from whole grains down to fine flours.
- Bulk ingredients: rice flakes, rice puffs, corn flakes, toasted oats.

作为我们围场到餐盘策略的一部分，自由食品集团不断整合我们的流程，以确保我们控制我们所有食品的质量和过敏原。我们在达尔顿点的工厂供应专门加工的、挤压的或片状的无过敏原原料，包括：无麸质谷物：膨化玉米，白玉米粉，黄玉米粉，黄玉米粉，玉米粉，米粉，高粱粉。这些可以从全谷物到精细面粉一应俱全。散装配料：大米片，大米泡芙，玉米片，烤燕麦片。

**\$430 MILLION**

**INVESTED OVER THE  
PAST 3 YEARS**

One of Australia's leading investors in  
State-of-the-Art Nutritional, Food &  
Beverage Manufacturing Capability  
in Australia

是澳大利亚最先进的营养，食品和  
饮料生产能力的领先投资者之一



FFGN

# Committed to Sustainability and Reducing our Environmental Footprint

Research shows two thirds of people will pay more for products from brands committed to environmentally friendly practices<sup>1</sup>

## Renewable Energy Consumption

- Installing across the total Shepparton site, **the largest on roof solar battery** project in Victoria
- Carbon offset for this project is in excess of 5,000 tonnes of CO<sub>2</sub> = 1,700 trees being planted
- Solar panels & battery project to be commenced at Ingleburn in FY 2020

## Reducing our Environmental Impact

- Installation of a chemical recovery and **recycling system** at Shepparton
- Significant reduction of sodium wastage into the water system
- Equivalent system is planned to be installed at Ingleburn in FY 2020



FFGN

NUTRAFERRIN™

## Protein at its Best - Naturally

- NUTRAFERRIN™ is extracted directly from cold, fresh, pure cow's milk and not from cheese or milk by products
- Our innovative manufacturing process is designed to minimise protein denaturation, thus optimising preservation of Lactoferrin's coveted functional properties and natural, non-denatured state
- Our controlled manufacturing process results in smaller, more uniform lactoferrin particles, permitting improved blending and solubility outcomes
- NUTRAFERRIN™ is highly purified, with a lactoferrin content of >95%
- Iron saturation levels ~16%, permitting additional iron-binding capacity and valuable biological activity

• *nutraferintm* 是直接从冷的、新鲜的纯牛奶中提取，而不是从奶酪或牛奶的副产品中提取。我们创新的制造工艺旨在最大限度地减少蛋白质变性，从而优化乳铁蛋白令人垂涎的功能特性和天然的、非变性状态的保存。我们的控制制造工艺导致更小、更均匀的乳铁蛋白颗粒，允许改善混合和溶解结果。  
• *nutraferrin TM* 是高度纯化的，乳铁蛋白含量为95%。铁饱和度和~16%，允许额外的铁结合能力和有价值的生物活性





FFGN

NUTRAFERRIN™

## Protein at its Best - Naturally

- Lactoferrin is strongly expressed in human and bovine milk. In humans, lactoferrin is also expressed predominately in mucosal epithelial and immune cells
- Lactoferrin is acknowledged for its healthful properties across the lifespan
- During infancy, lactoferrin plays a role in iron homeostasis and defense against microorganisms
- Post weaning, lactoferrin's multiple physiological effects include a role in immune regulation, iron homeostasis, digestive function, dermatological outcomes, oxidative stress, antimicrobial and anti-inflammatory influences

蛋白质处于最佳状态-天然的

• 乳铁蛋白在人奶和牛奶中强烈表达。在人类中，乳铁蛋白也主要在黏膜上皮细胞和免疫细胞中表达 • 乳铁蛋白因其在整个生命周期中的健康属性而被公认 • 在婴儿期，乳铁蛋白在铁稳态和抵御微生物方面发挥作用 • 断奶后，乳铁蛋白的多种生理作用包括免疫调节、铁稳态、消化功能、皮肤病学结果、氧化应激、抗菌和抗炎影响

MAKING FOOD BETTER

# LACTOFERRIN

## Recognised Effects on Human Health

**Lactoferrin has multifunction properties in human health** 乳铁蛋白在人体健康中具有多种功能

Thousands of scientific papers have been published since the discovery of lactoferrin in 1939, which have clearly established its multiple functions at the physiological, cellular, and molecular levels

自从1939年发现乳铁蛋白以来，已经发表了数以千计的科学论文，这些论文清楚地证明了乳铁蛋白在生理、细胞和分子水平上的多种功能

Skin Health

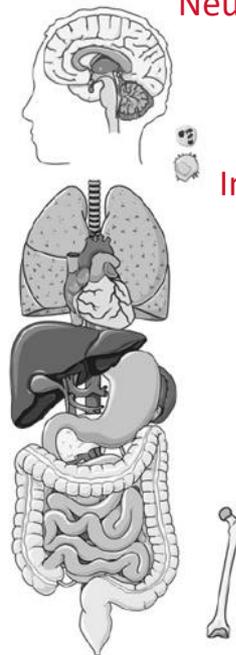
Neurological

Immune System

Iron Homeostasis

Digestive Health

Bone Health



# What Comprises Milk?

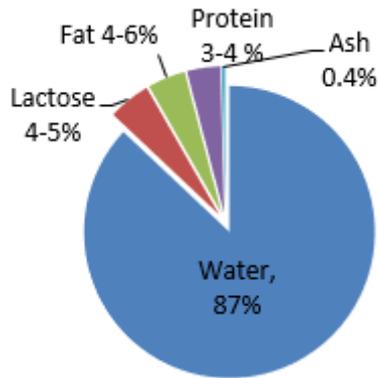
WHAT IS  
MILK MADE OF?



# Milk Whey Protein Contains Native Lactoferrin at ~2%

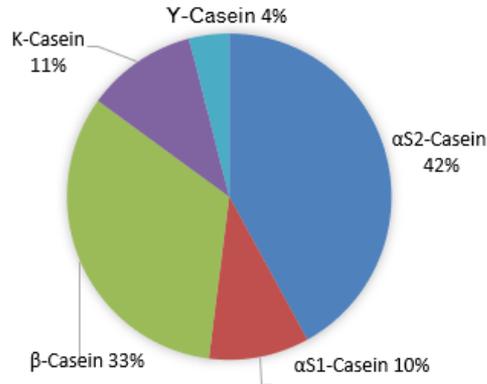
## FRESH MILK COMPOSITION

鲜奶成分



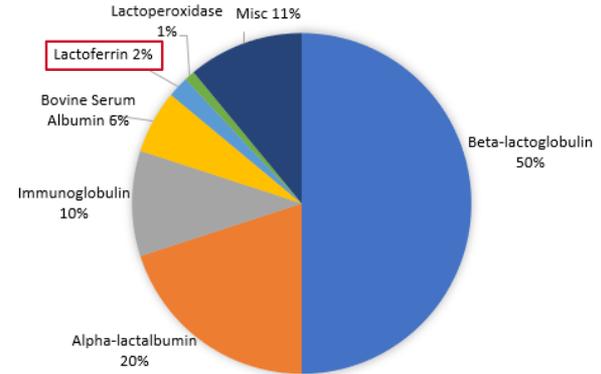
## FRESH MILK CASEIN PROTEINS 80% TOTAL PROTEINS

新鲜牛奶酪蛋白占总蛋白的80%



## FRESH MILK WHEY PROTEINS 20% TOTAL PROTEINS

鲜奶乳清蛋白占总蛋白的20%

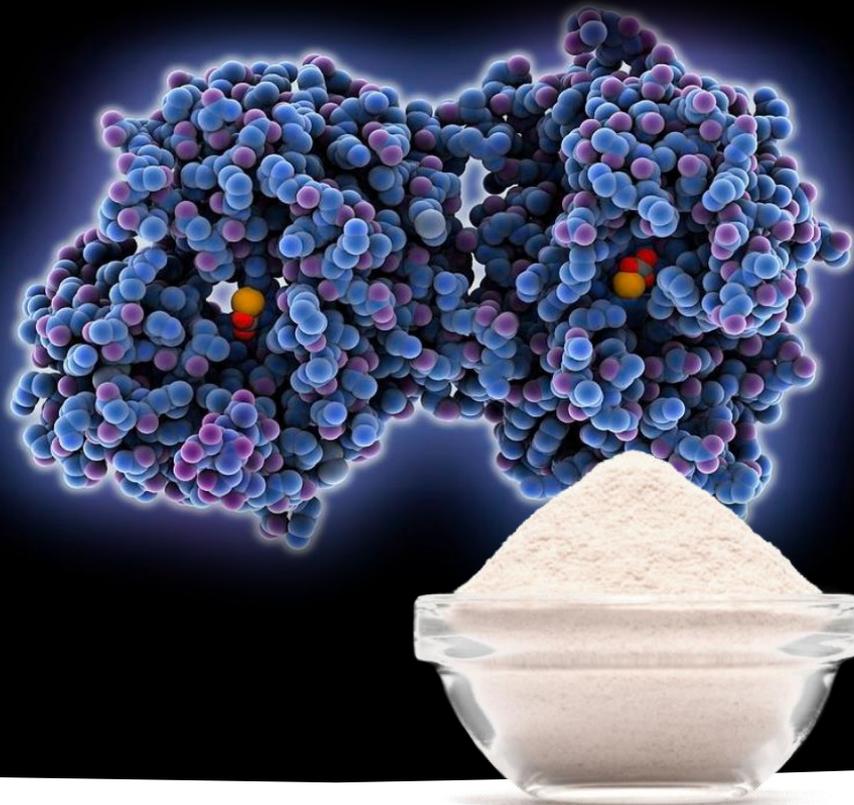


# What is FFGN NUTRAFERRIN™ ?

## LACTOFERRIN - Protein at its Best

- NUTRAFERRIN™ is an ultra-premium, spray-dried, high purity Lactoferrin.
- It is prepared directly from fresh cow's milk, by passing it through our innovative manufacturing process which is designed to minimise protein denaturation and maintain the functional properties of NUTRAFERRIN™ at their best.

• *nutraferintm* 是一种超级优质、喷雾干燥、高纯度的乳铁蛋白。 • 它直接从新鲜牛奶中提取，通过我们创新的制造工艺将其传递到最小化蛋白质变性，并最大限度地保持 *nutraferrinTM* 的功能特性。





# Colour is Obviously Different and Intentionally Premium

## SPRAY DRYING



Spray dried lactoferrin colour is better suited to dry blending applications, as its colour 'blends' in with base powders

喷雾干燥乳铁蛋白颜色更适合于干混合应用，因为它的颜色“混合”在基本粉末

Spray dried lactoferrin is a light pink, premium colour



喷雾干乳铁蛋白是一种浅粉红色，优质颜色



## FREEZE DRYING

Freeze dried, darker lactoferrin colour is more resistant to 'blending' with background base powder colour, and may cause 'foreign matter' appearance

冷冻干燥，乳铁蛋白颜色越深，越不容易与底色粉混合，而且可能会引起外观上的异物



Freeze dried lactoferrin has a reddish, 'glassy' reflective colour

冷冻干燥乳铁蛋白呈红色，呈玻璃状反光



Physical properties of spray dried compared with freeze dried lactoferrin produces colour differences

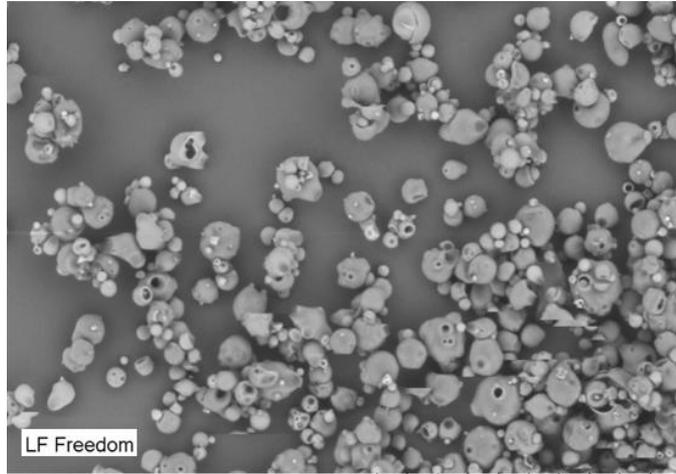
喷雾干燥乳铁蛋白与冷冻干燥乳铁蛋白的物理性质存在颜色差异

NUTRAFERRIN™

# Particle Shape Benefit of Spray Drying

## SPRAY DRYING

produces more globular lactoferrin particles



AL D3.6 x250 300 μm

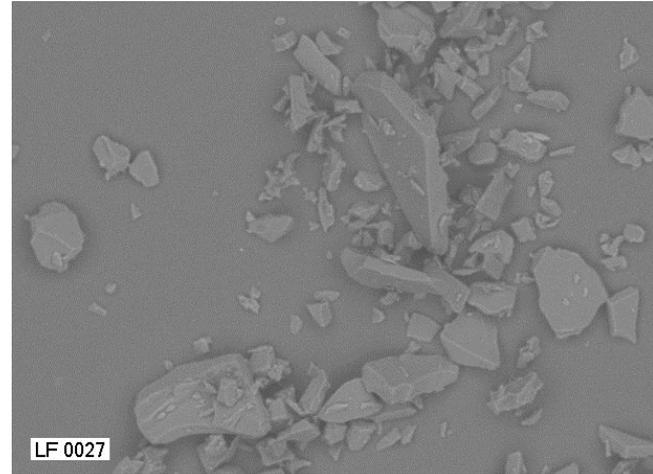
Spray dried lactoferrin is more uniform in shape, with lighter, fluffier particles and low light scattering effect

喷雾干燥的乳铁蛋白形状更加均匀，颗粒更轻，更蓬松，光散射效果更低



## HIGHER TEMPERATURE SPRAY DRYING

produces flat-shaped lactoferrin particles



14:26 AL D9.2 x250 300 μm

Freeze dried lactoferrin is a flat, dense particle which can cause it to be reflective (higher light scattering effect.)

冷冻干燥乳铁蛋白是一种扁平、致密的颗粒，可以使其具有反射性更高的光散射效应



# Particle Size Benefit of Spray Drying

## SPRAY DRYING



provides improved control over particle size distribution. Particle size may be tailor designed, to suit variable applications

	LSL	USL	Target
D10 Qm	10	30	15
D50 Qm	25	50	35
D90 Qm	60	90	70

Spray dried lactoferrin particles can be tailored to suit any application



## FREEZE DRYING

fractures particles during the milling process, affecting particle size and other functional properties. Freeze drying produces poorly controlled irregularity in lactoferrin particle size

	LSL	USL	Target
D10 Qm	10	30	20
D50 Qm	40	80	50
D90 Qm		110	100

Freeze dried lactoferrin is milled after drying and so typically has a wider particle size range



NUTRAFERRIN™

# FFGN Lower Temperature Spray Drying Impacts Moisture

- Lactoferrin's moisture content influences its functional properties
- Lower moisture lactoferrin tends to be more fragile, exhibits poorer solubility and is more inclined to be 'dusty', affecting yield loss during end stage use

## SPRAY DRYING



NUTRAFERRIN™ has a higher moisture level than freeze dried lactoferrin

Typical spray dried lactoferrin moisture levels are 3.0 to 4%



## FREEZE DRYING

Freeze dried product has a lower moisture content due to the poor control over the freeze drying process

Typical freeze dried lactoferrin moisture levels are 0.8 to 1.5%

NUTRAFERRIN™

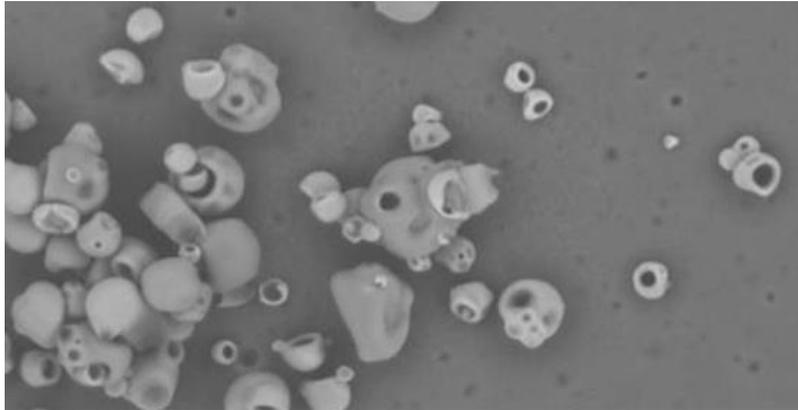
# FFGN Low Heat Spray Drying for Best Results

电子显微镜显示高温喷雾干燥可能会破坏乳铁蛋白

- Electron Microscopy shows higher temperature spray drying may damage lactoferrin
- NUTRAFERRIN™'s lower heat drying minimises damage to natural particles

## SPRAY DRYING

NUTRAFERRIN™ - Lower Temperature Spray Drying

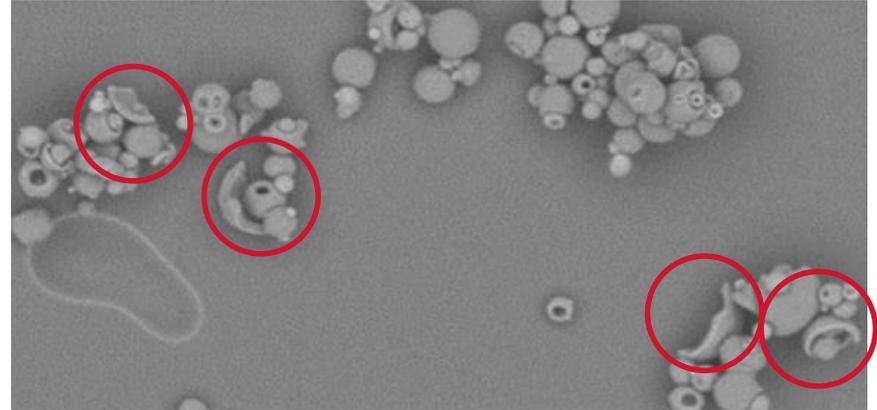


NUTRAFERRIN™ is dried at lower temperatures, minimising heat damage and producing lactoferrin structures without fragmentation. It has marginally higher moisture content than higher temperature spray drying and freeze drying

在较低的温度下进行干燥，可以最大限度地减少热损伤，并且不会破碎地产生乳铁蛋白结构。它的水分含量略高于高温喷雾干燥和冷冻干燥

## HIGHER TEMPERATURE SPRAY DRYING

Competitor - Higher Temperature Spray Drying



Higher temperature spray drying may marginally reduce moisture content, but damages lactoferrin particles, creating fragments and affecting lactoferrin functionality (solubility, dust generation and high yield loss)

高温喷雾干燥可能略微降低水分含量，但破坏乳铁蛋白颗粒，产生碎片，影响乳铁蛋白的功能性(溶解性、产尘和高产量损失)



NUTRAFERRIN™

# Solubility Benefit of Spray Dried

Improved solubility of spray dried lactoferrin comes from particle size variation<sup>(1)</sup>

## SPRAY DRYING



Improved solubility, likely due to the increased surface area of the smaller, more uniform particle size of spray dried lactoferrin

Solubility 98.4 %

提高了乳铁蛋白的溶解性，可能是由于喷雾干燥的乳铁蛋白粒径更小、更均匀的比表面积增加了  
溶解度98.4%

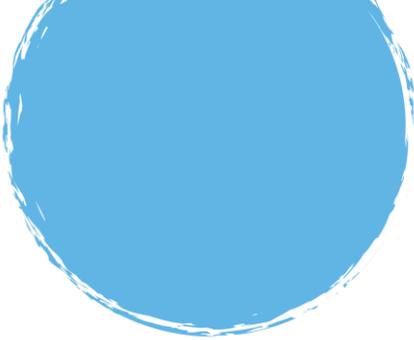


## FREEZE DRYING

Decreased solubility, which reportedly may be due to the larger particle size and consequent reduced surface area/energy of solute particles

Solubility 94.3 %

溶解度降低，据报道可能是由于较大的粒子尺寸和随之而来的表面积 / 溶质粒子的能量减少



# Current Industry Drying Technology Utilisation

Competitors are slowly shifting to spray drying in pursuit of its superiority

Infrastructure costs will set the pace of competitor drift to this state-of-the art technology

*竞争对手正在慢慢转向喷雾干燥，以追求其优越性，基础设施成本将设置竞争对手的速度漂移到这个国家的最先进的技术*

Manufacturing Site	Technology Utilised	Manufacturing Site	Technology Utilised
Freedom Foods Group Nutritionals	Spray Dryer (superior technology)	4 other global competitors	Spray Dryer (superior technology)
9 global competitors	Freeze Dryer (old technology)	2 global competitors	Freeze and Spray Dryer



# Physical Characteristics





# Typical Parameter Levels

Parameter	Typical	Specification	Test Method
Lactoferrin % of protein	≥ 95.0-100	95.0 min	FFGN In-House HPLC
Moisture %	4.0	4.50 max	GB 5009.3.1-2016
Ash %	0.5	2.0 max	GB 5009.4.1-2016
pH (2% Solution)	6.2	5.2 to 7.2	PHAS 06 06.03
*Iron content (mg/100 g)	18	≤ 35	GB 5009.268.2-2016
*Iron saturation %	16	< 20	LFST 06.03

# NUTRAFERRIN™ ADVANTAGES

核铁蛋白的优势

**NUTRAFERRIN™**

# Advantages

Prepared directly from fresh cow's milk via our innovative 4-step manufacturing process, NUTRAFERRIN™ presents an Australian made and functionally superior alternative to other Lactoferrin options

通过我们创新的四步法生产工艺，直接从新鲜牛奶中提取乳铁蛋白，nutraintm 提供了一种澳大利亚制造的、功能上优于其他乳铁蛋白的选择

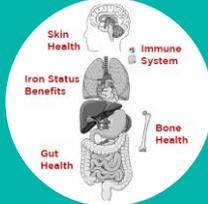


Spray Drying Delivers Improved Functional Outcomes.

Freeze Drying Technology is Outdated.

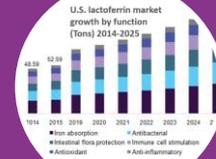
Pasteurising Lactoferrin Post Ion Exchange Preserves Its Natural State.

喷雾干燥提供改善的功能结果。冷冻干燥技术已经过时，巴氏消毒乳铁蛋白离子交换后保存其自然状态。



Lactoferrin has Acknowledged Physiological Benefits Across the Lifespan, Including Neurological, Prebiotic, Antibacterial, Anti-inflammatory and Immunological.

乳铁蛋白在生命周期的各个阶段都具有生理学上的益处，包括神经学、益生菌、抗菌、抗炎和免疫学。



Global Lactoferrin Growth Opportunity Exists Across a Broad Range of Applications, Providing Exciting Innovation Potential for Visionary Leaders.

<https://www.grandviewresearch.com/industry-analysis/lactoferrin-market>



NUTRAFERRIN™ is Visibly Different. It's Finer, Fluffier and Lighter in Colour, with a Consistent Particle Size that Facilitates Uniform Blending With Base Formulations, thus Minimising Illusions of Foreign Matter.

显然不同。它更细，更蓬松，颜色更浅，颗粒大小一致，有利于与基本配方的均匀混合，从而减少外来物质的错觉。



State-of-the-Art Nutritional, Food & Beverage Manufacturing Capability in Australia.

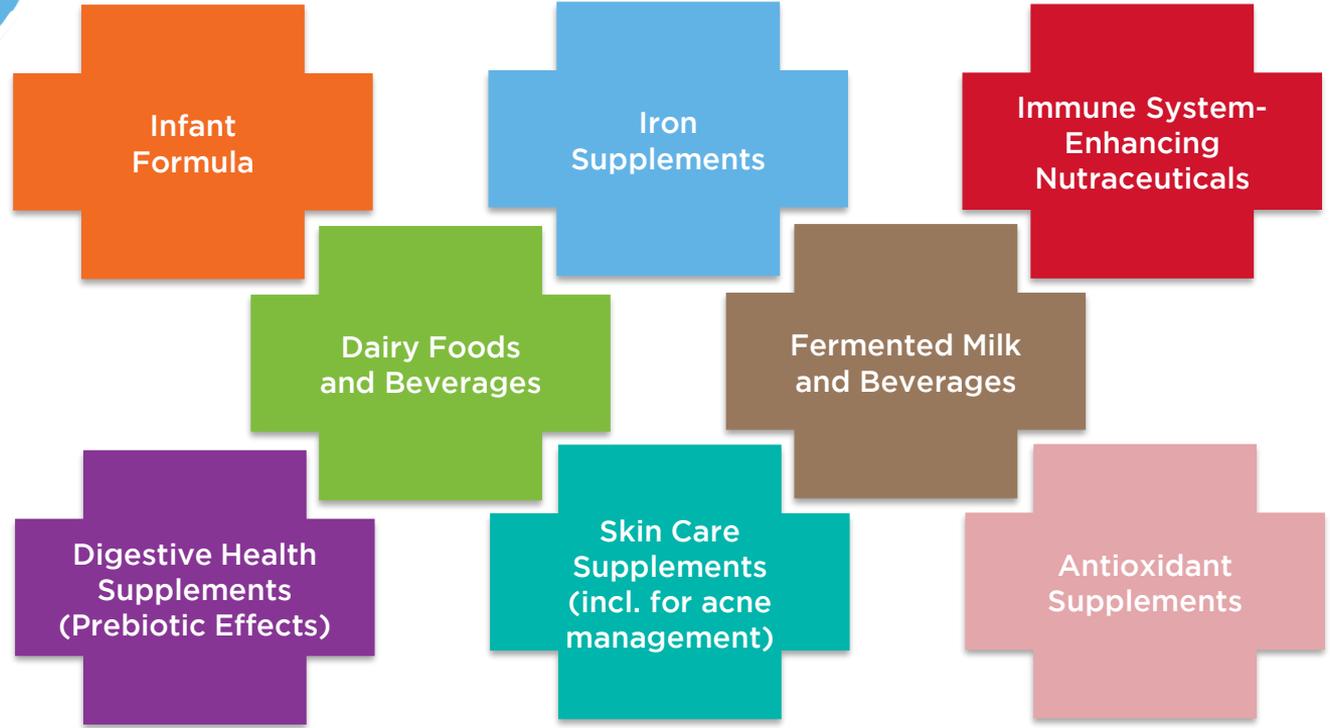
Responsibly Reducing our Environmental Impact Through Investment in Sustainable Energy Alternatives.

*Two thirds of people will pay more for products from brands committed to environmentally friendly practices<sup>(1)</sup>*



NUTRAFERRIN™

# Drive innovative potential





MAKING FOOD BETTER