

The Consumer Education Project of Milk South Africa

THE DAIRY MATRIX



**An Initiative by the
Consumer Education Project
of Milk SA**

**MORE
THAN THE SUM
OF THE NUTRIENTS.**

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www.rediscoverdairy.co.za

Outline of presentation

- Overview
- Whole foods versus single nutrients
- What does the term Food Matrix mean?
- Looking at DAIRY
- The Dairy Matrix
- The Dairy Matrix Health Effects



Overview

What's on the label?

TYPICAL NUTRITIONAL INFORMATION		
Average values	per 100 g	per 20 g serving (l pack)
Energy	1550 kJ	310 kJ
Protein	11,9 g	2,4 g
Glycaemic carbohydrate	73 g	15 g
of which total sugar	2,5 g	0,5 g
Total fat	3,0 g	0,6 g
of which:		
saturated fat	0,7 g	0,1 g
trans fat	0,0 g	0,0 g
monounsaturated fat	0,5 g	0,1 g
polyunsaturated fat	1,8 g	0,4 g
Cholesterol	0 mg	0 mg
Dietary fibre*	3,3 g	0,7 g
Total sodium	662 mg	128 mg



Overview

- 20th Century
 - Discovery of individual nutrients
 - vitamins
 - minerals
 - amino acids
 - Role of individual nutrients in relation to maintenance of health and prevention of disease
 - vit C – elimination of scurvy
 - vit K – blood coagulation



Overview

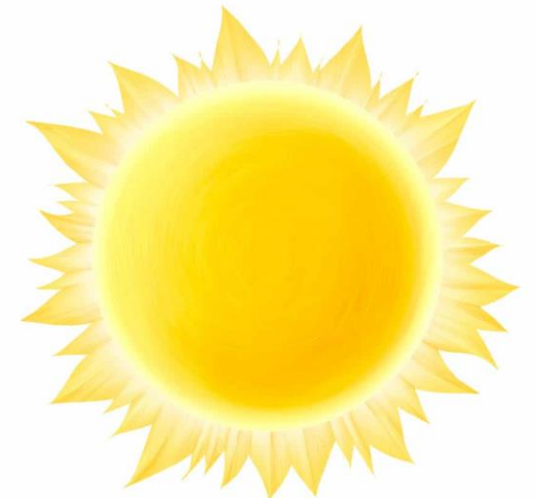
Targeted fortification

- iodisation of salt
- fortification of fresh milk with vit D



Vitamin D in milk

- Milk is naturally low in vitamin D
- Fortified in countries like the US and Europe
- Fresh milk in SA is NOT fortified with vit D
- Some UHT milk in SA contains added vit D



Overview

○ REDUCTIONIST' APPROACH

- Key in the establishment of nutrient recommendations
 - RDAs
 - FBDGs
- To maintain health and prevent chronic disease



Overview

○ Reductionist approach

Unintended consequences...

Good or bad food

Super foods

○ Progress in Science

Developed the need to recognise the importance of **whole foods** and the **effect of dietary patterns** became evident

Dietary guidance should be based on the evaluation of the **health impact of whole foods** rather than the individual nutrients it contain.



Whole Food versus Single Nutrients

Nutrition science has shifted

Single
nutrients

Whole
foods

Dietary
patterns

The Food Matrix Effect



HEALTH

Whole Food versus Single Nutrients

Nutrition science has shifted

Change in focus

- Nutrient energy deficiencies
 - Overnutrition and an increase in overweight and obesity
 - Increase in non-communicable diseases
- Epidemiological science
 - Insight in the association between whole foods and NCDs
 - Seeds, vegetables and fruit – decrease of CVD
 - Red and processed meat – increase in risk of colorectal cancer



Consensus about the association – cannot entirely be explained by nutrients

What does the term Food Matrix mean?

Describes a food in terms of

- its physical structure
- Its nutrient and non-nutrient content

HOW THEY INTERACT TOGETHER



IMPACT

- nutrient absorption
- nutrient metabolism

Affecting overall NUTRITIONAL and HEALTH properties of the food



Looking at DAIRY

- DAIRY is a good example of the Food Matrix
- Dairy naturally contain a unique package of nutrients
 - High quality protein
 - Calcium
 - Potassium
 - Vit A, B12, B2
 - Phosphorous
 - Magnesium
 - Iodine
 - Carbohydrates
 - Fatty acids
 - Bioactive components



DAIRY'S PHYSICAL STRUCTURES



DAIRY's PHYSICAL STRUCTURES

Affect the
BIOAVAILABILITY of nutrients
the way they are **DIGESTED**
ABSORPTION by the body

HEALTH EFFECTS after consumption

Fluid

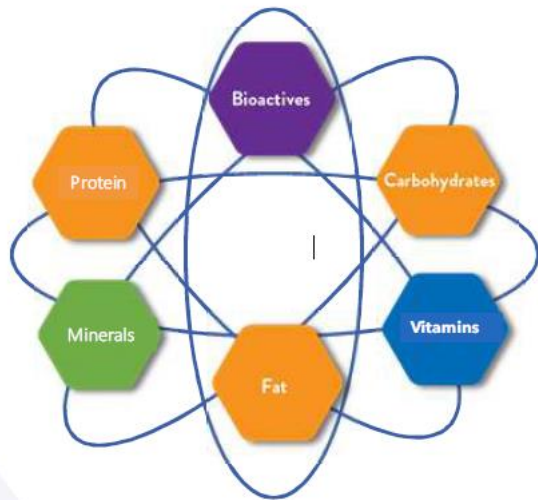
Semi-solid

Solid

The Dairy Matrix

The nutrients in DAIRY act like a team

WITHIN the specific structure they operate in



Dairy as a **WHOLE FOOD** is greater than the sum of its parts

The Dairy Matrix

Definition as adopted by the IDF

Dairy matrix describes the unique structure of a dairy food, its components (e.g. nutrients and non-nutrients) and how they interact.

Dairy matrix health effects refer to the impact of the whole dairy food on health that extends beyond its individual components (e.g. nutrients and non-nutrients)



The Dairy Matrix Health effects

Have milk, maas or yoghurt every day

South African Food-based dietary guidelines

Included due to

- its nutrient richness
- the key role they play in human nutrition, health and development throughout life

Dairy supply 3 of the 4 nutrients generally lacking in the South African diet

- calcium, potassium and vitamin A

Guidelines generally limit the use of full-cream dairy and cheese due to SFA and Sodium content

Food guide recommends

- low fat or fat free milk
- plain low-fat or fat free yoghurt



The Dairy Matrix Health effects



Latest research relates to **WHOLE FOOD** effects of food and the **DAIRY MATRIX** shows that full-cream milk and cheese are NOT associated with an increased cardiometabolic risk and do not cause weight gain

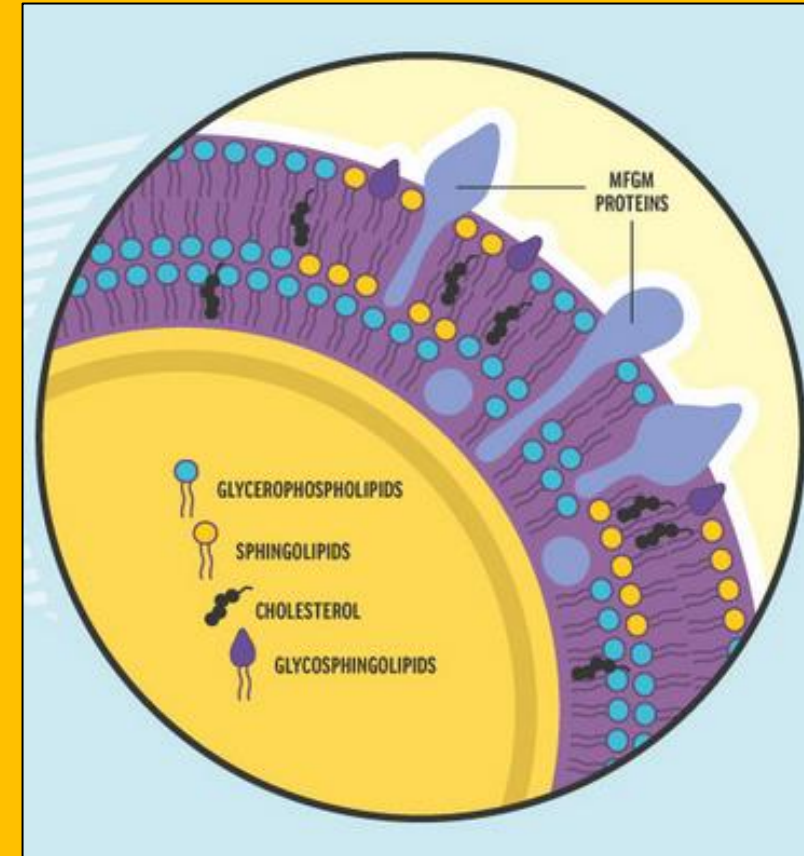
The exact reason for the benefits are still unclear but could be related to

- the complex fatty acid profile of milk
- the milk fat globule membrane and
- the presence of calcium

The Dairy Matrix health effects

🔹 Focussing on the **fats in dairy**

- There are more than **400 different types of fatty acids** in milk.
- **Not all fats are equal.**
- The **milk fat globule membranes** have a significant effect on the
 - digestion of dairy products and
 - the uptake of dairy fat
- The MFGM prevent the negative effects of saturated fatty acids on LDL-cholesterol
➔ decrease CVD and in some cases even a beneficial effect on heart disease
- Fermented dairy products with healthy bacteria that produce **bioactive peptides** and **short-chain fatty acids** an in addition have other specific health effects.



Calcium supplements versus DAIRY calcium

- **DAIRY** is considered the best dietary source of calcium
- plays an important role in bone health.
- is associated with
 - a decreased risk of colorectal cancer and Type 2 diabetes
 - a neutral effect on cardiovascular disease

Some of these effects can be explained by calcium

CALCIUM SUPPLEMENTATION

protects against colorectal cancer.

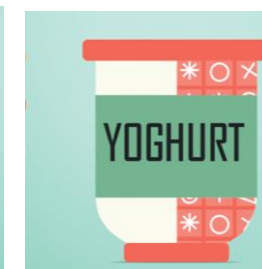
BUT the intake of calcium supplements is associated with a higher risk of cardiovascular diseases

An effect **NOT FOUND** with dairy

Confirmation of the **FOOD MATRIX EFFECT.**



Dairy Matrix effect



Cheese matrix study

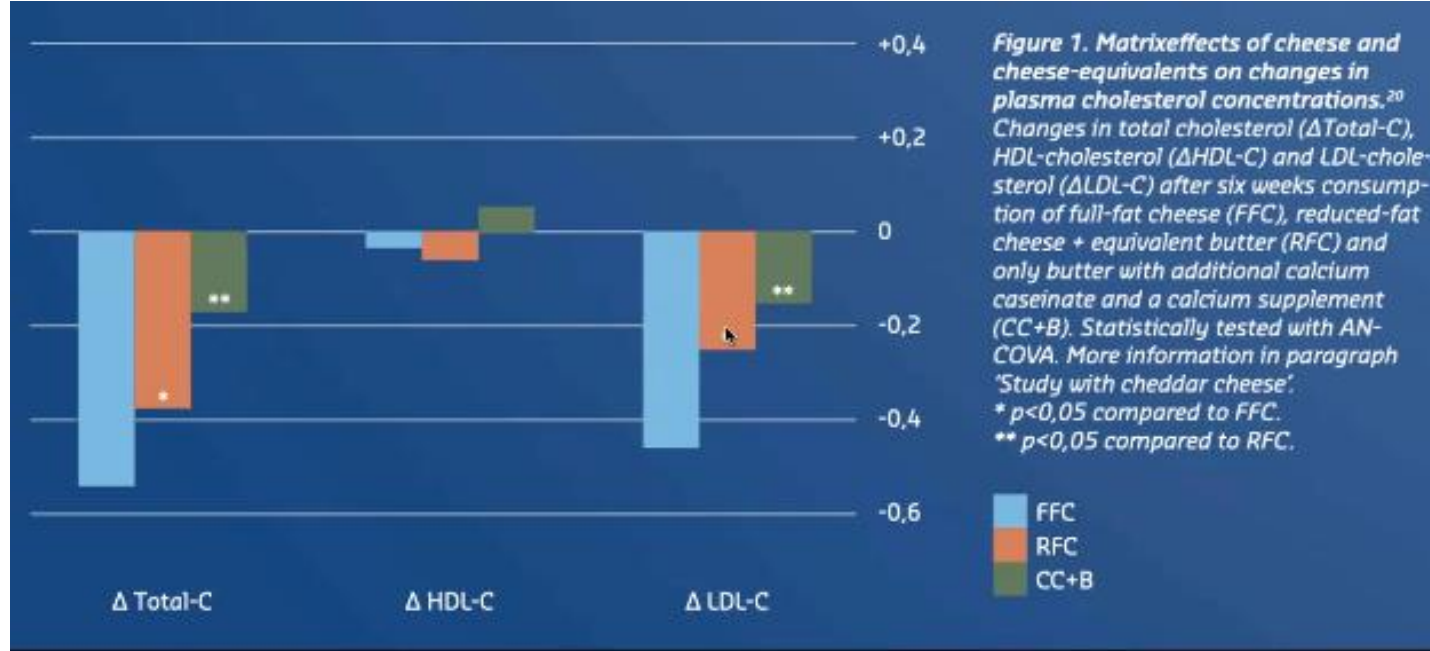
The effect of **CHEESE** on LDL cholesterol

- Participants consumed 42 grams of dairy fat/d for six weeks
 - Same amount of calcium and protein different compositions
 - Cheddar cheese
 - Reduced-fat cheese plus equivalent butter
 - All fat in the form of butter + calcium supplement + caseinate
- to mimic the macronutrient content of cheese

Dairy Matrix effect



Cheese matrix study



Rosqvist F et al (2015) Am J of Clin Nutr 102 (1) 20-30

After 6 weeks

- Cheddar cheese group
Total Chol and LDL-Chol significantly lower than the reduce-fat cheese group
- Reduced fat cheese group
Total Chol and LDL-Chol lower than the butter group

The effects of nutrients eaten in a **whole food** are significantly different from that of a **mixture of the same nutrients**

Dairy Matrix effect

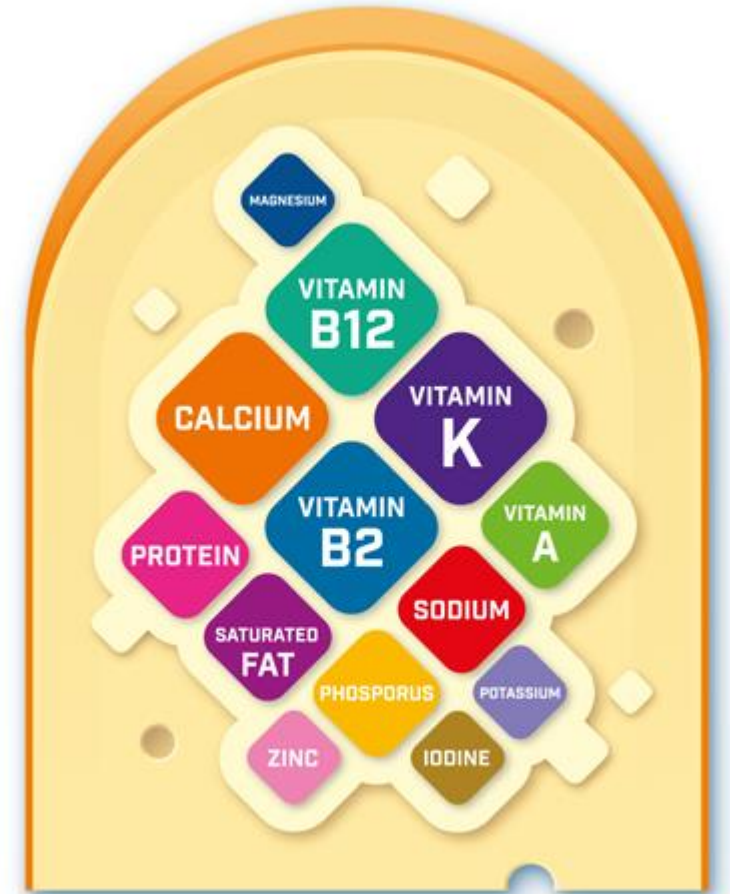


Dairy Matrix effect

Cheese study

The W H O L E is

**MORE
THAN THE SUM
OF THE NUTRIENTS.**

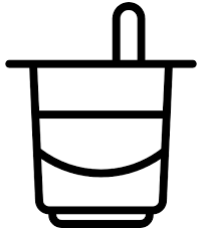


The Dairy Matrix health effects



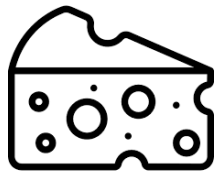
Total dairy intake is associated with

- General health indicators
- Bone and muscle health
- Decrease in NCD
 - overweight
 - type 2 Diabetes
 - hypertension
 - certain cancers



Fermented dairy intake is associated with

- Improved digestion and gut microbiota
- Appetite regulation and weight loss
- Decrease in type 2 diabetes
- Improved hypertension control
- Anti-inflammatory response



Cheese intake

- Neutral or lower risk for
 - CVD
 - stroke
 - hypertension



Conclusion

- The Dairy Matrix cannot be mimicked
- Further research is needed
- The food matrix concept embraces the importance of **whole foods**

together with their individual components.



Research and communication on the Dairy Matrix

International Dairy Federation – mapping all published literature that has been performed from 2012 till 2022

- **Food Matrix** – 75 research papers
- **Dairy Matrix** – 79 research papers
- papers provided by experts only
- only analysis in relation to nutrition and health
- no in vitro or animal studies
- no repetition



IDF strives to make sure that more research is published on the subject and that presentations about the Dairy Matrix and its health effects are presented at congresses and symposiums globally

<https://fil-idf.org/our-work/nutrition-and-health/>

Research and communication on the Dairy Matrix

Consumer Education Project of Milk SA

- **Evidence -based reviews on the Dairy Matrix**

- DBN 32 – The Dairy Matrix explained – Health benefits beyond the individual nutrients
- IDF fact sheet – The importance of the dairy matrix in the evaluation of the nutrition quality and health effects of dairy foods
- The Food Matrix – Food is more than the sum of its nutrients

- **Presentations**

- Prof Arne Astrup: Saturated fat and CVD: a need for revision of current recommendations?
- Prof Renee Blaauw: Not all fats are the same. Special reference to dairy and cardiovascular disease

- **Videos:**

- The Dairy Matrix Explained – European Milk Forum
- The Food Matrix – Dr Stephan Peters, The Netherlands
- The Dairy Matrix – Consumer Education project of Milk SA

<https://www.rediscoverdairy.co.za/dairy-matrix/>



THANK YOU FOR LISTENING

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**Communicating the nutritional
and health benefits of dairy**

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