SUSTAINABLE DIETS:

FACTORS TO CONSIDER

What is a sustainable diet?

Initially emphasis was on “balanced diets”

Global threats such as climate change, pollution, hormone disrupters and impending “water wars” influenced the concept

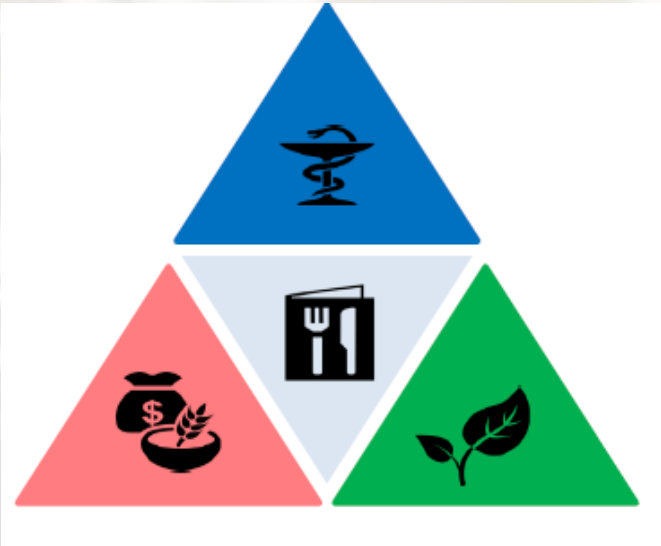
New model of “sustainable diets” by FAO

What is a sustainable diet?

Four broad pillars:

- Nutrition
- Economics
- Society
- Environment

IDEAL: diet that is nutritionally adequate, economically affordable, socially acceptable and eco friendly



Nutrition

Variety of measures to assess food intake

Nutrient profiling (NP) methods were developed to justify nutrient and health claims

Most recently NP has been used to justify taxation of sugar sweetened beverages and foods

Affordability

Measurement of calories and nutrients (macro- and micronutrients) per monetary unit

Nutrient rich diets more expensive than empty calorie diets and more costly from an environmental point of view

Affordability

Animal source foods (meat, poultry, eggs, dairy) have a higher nutrient content per calorie

But require more water, land and energy to produce than staple food (rice, maize, wheat and grains)

More costlier to produce

Social acceptability

Animal source foods replace plant based foods

Vegetarian and Mediterranean diets

However, not culturally acceptable to all populations

Even nutrient dense, economically viable and environmentally acceptable diets can be rejected for cultural reasons

Environmentally friendly

Food production requires water, land and energy

All of this are sought after as global population grows, pollution increases and climate changes

Livestock production has a greater environmental impact than grains, but has a significant contribution to human health

Carbon taxing

DAIRY and sustainability

Nutrition

High energy dense foods usually contain more calories than nutrients

NP methods used to classify foods into nutrient dense categories

E.g. dairy and calcium: dairy have a low energy density but high calcium content compared to high energy-density rice milk

Dairy and sustainability

Nutrition

Second nutrient brought into the equation – protein

Plant protein consumption should increase by 30-40%

Using this 2 nutrient matrix, milk and dairy are classified as nutrient rich food providing more nutrients than energy

Dairy and sustainability

Economics

Vegetables, fruit, meat, poultry and fish cost more per 100g than sweets, grains and fats

Milk and dairy cost less than meat, poultry and fish

Milk and dairy have a lower energy density and higher nutrient density than grains and fats

Dairy and sustainability

Cultural acceptance

Cultural acceptability has an important influence on “trade offs”

E.g. if meat is too expensive as protein source, plant protein from pulses and legumes may be accepted, whereas protein from insects or algae not

Milk and dairy are mostly acceptable

Dairy and sustainability

Environmental impact

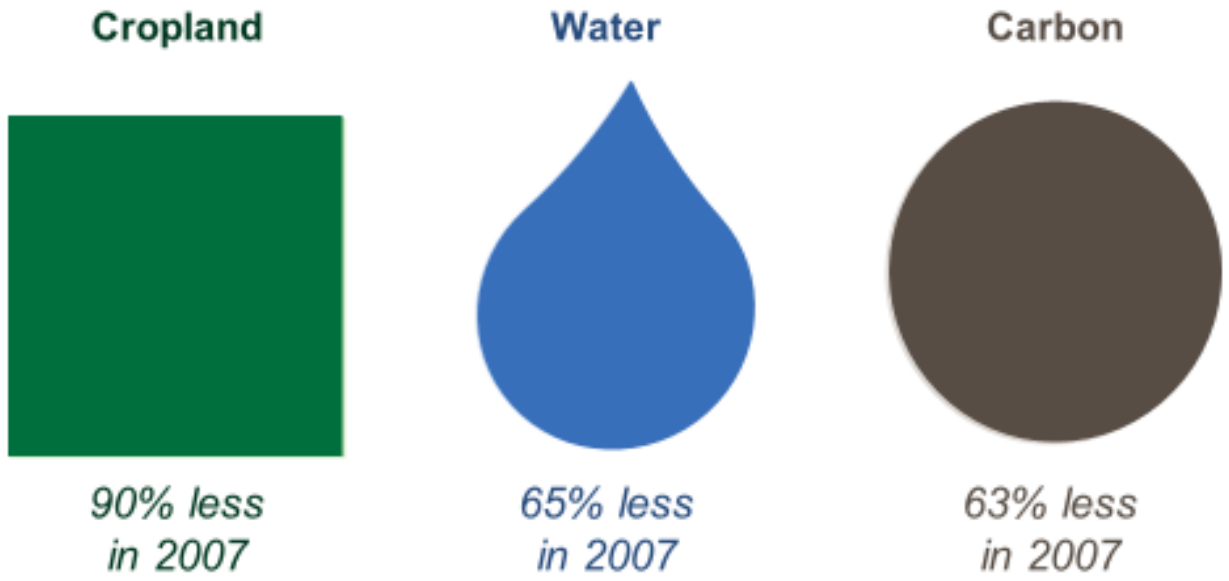
Environmental cost which can be measured by greenhouse emissions or the carbon footprint

No agreement as to which metric should be use

Dairy and fermented products may be acceptable replacements without increased damage to the environment

Environmental impact

Since 1944, producing a gallon of milk requires fewer resources



The US produces 59% more milk using 64% less cows

INNOVATION CENTER FOR U.S. DAIRY
HEALTHY PEOPLE • HEALTHY PRODUCTS • HEALTHY PLANET

Source: Capper JL, Cady RA, Bauman D. The environmental impact of dairy production: 1944 compared with 2007. *J Anim Sci.* 2009;87(6):2160-2167.

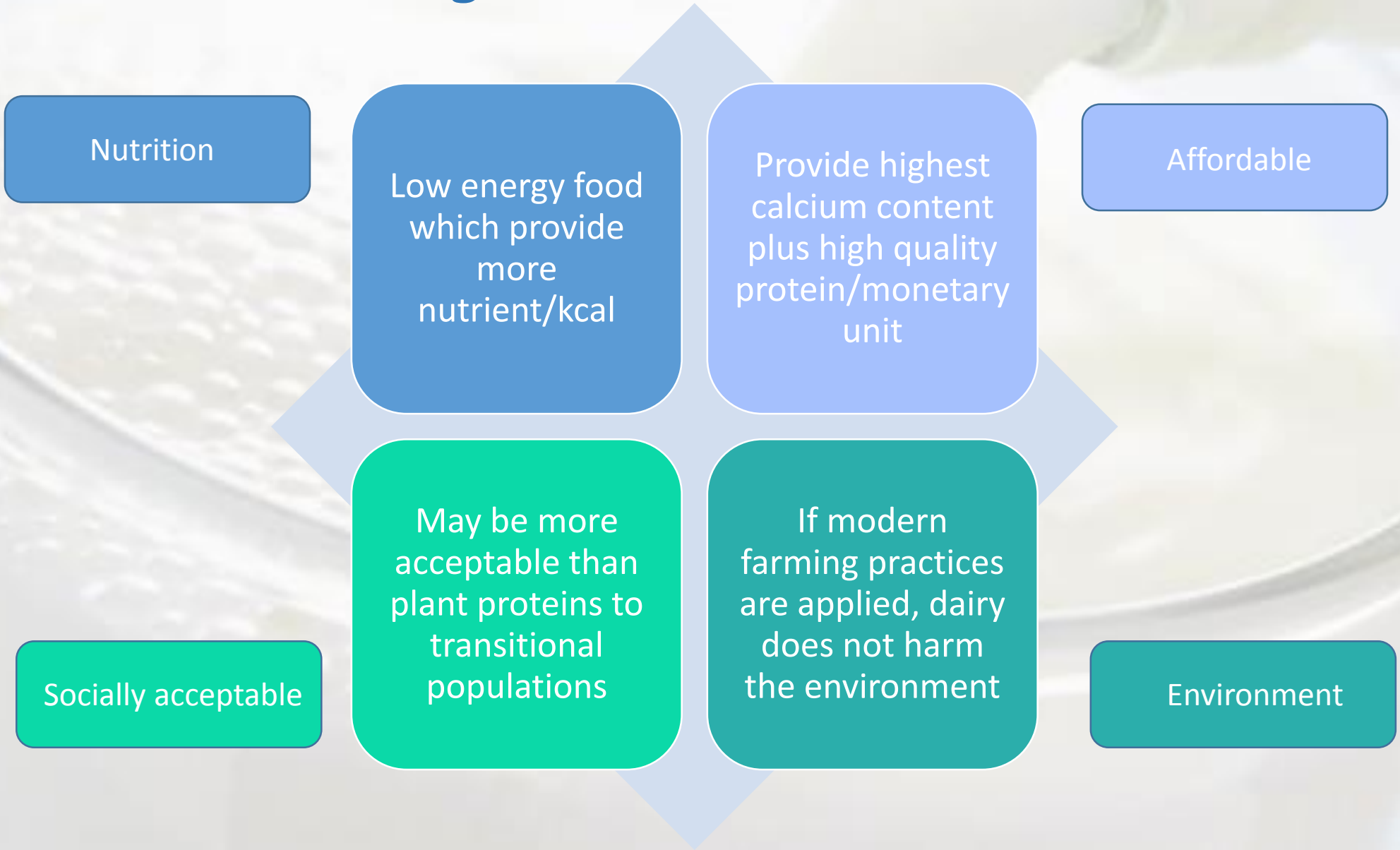
Environmental impact

Highlighting what producers are already doing

- Feed efficiency
- Herd management and animal health
- Manure management
- Route design and efficiency
- Energy efficiency

→ **Environmental, economic and social impact improvements**

Dairy is sustainable

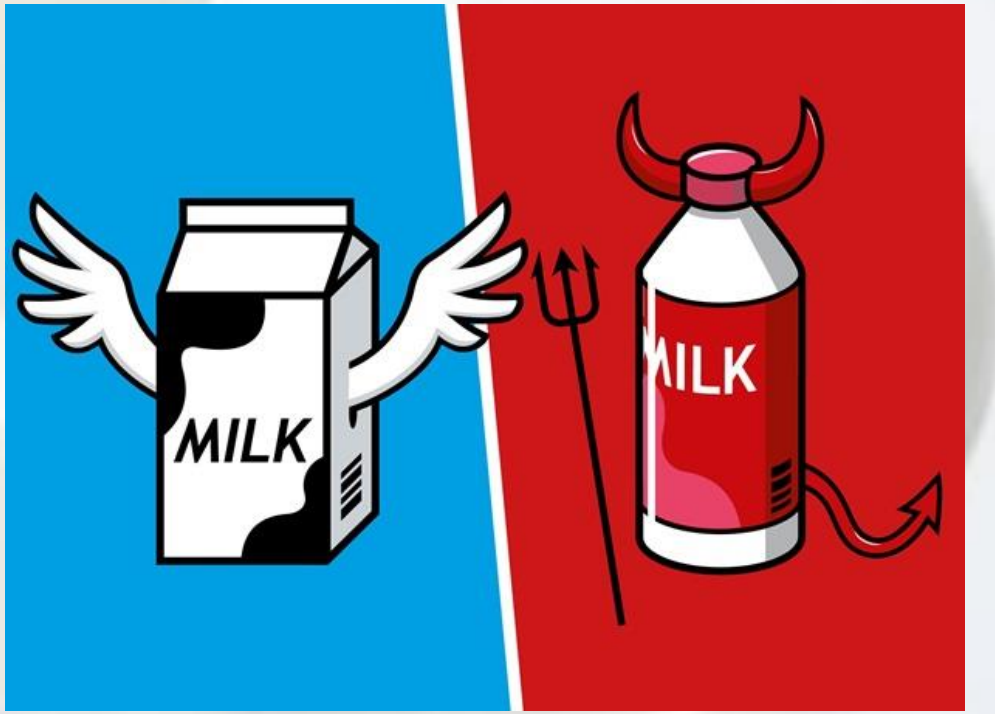


Unfortunately in the anti-dairy industry, plant based beverages are considered as a more sustainable option

It is important to know and distinguish the differences between dairy and plant based alternatives

Why do people exclude milk from their diets?

- Cow's milk allergy
- Lactose intolerance
- Following a trend
- Exclusion diets
- Personal lifestyle, e.g. vegan
- Beliefs about animal mistreatment



National Osteoporosis Society: 70% of individuals between 18 - 24 have tried diets cutting out major food groups

Survey from the United States Department of Agriculture (USDA): progressive decrease in consumption of cow's milk with concurrent increase of non-dairy beverages

Plant-based beverages are increasingly used as alternatives to cow's milk

Several are fortified in an attempt to match dairy's unique nutrient matrix

Assumption that dairy alternatives are just as healthy as dairy foods

ASSUMPTION

If something is called “milk”, and looks like milk, it has the same nutritional properties as cow's milk

Nutritional contents of plant-based products depend on the source, methods of processing and fortification

Typical plant-based alternatives

- Soya milk
- Almond milk
- Coconut milk
- Rice milk
- Oat milk

Plant-based milk alternatives do not have the same nutritional content as cow’s milk

Main difference: alternatives are not innately high in nutrients necessitating fortification

Cow’s milk is a natural source of calcium and other micronutrients, with a higher bioavailability

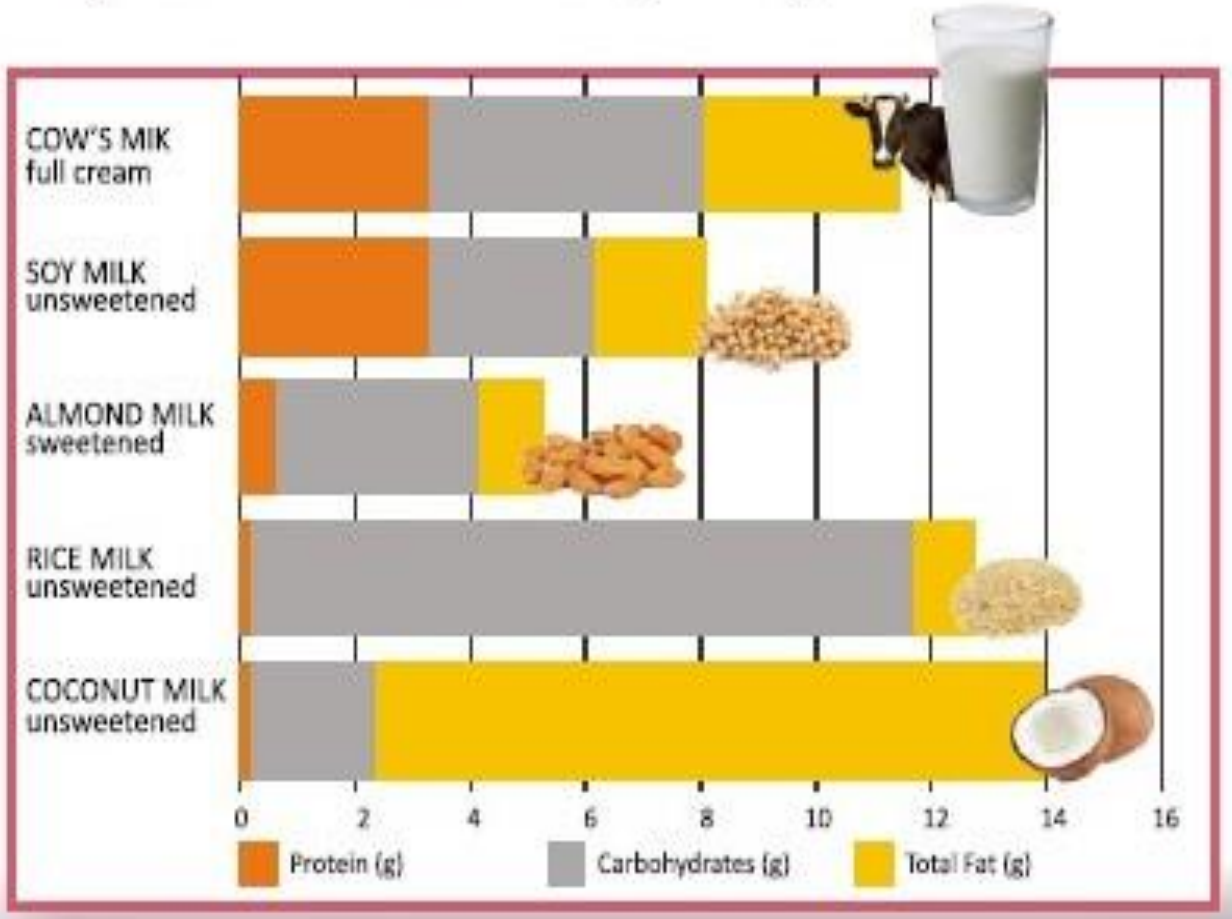
	Cow's milk full cream	Soy milk unsweetened	Almond milk sweetened	Rice milk unsweetened	Coconut milk unsweetened
Protein	3,3 g	3,3 g	0,6 g	0,2 g	0,2 g
Carbohydrates	4,7 g	2,8 g	3,5 g	11,4 g	2,2 g
Total Fat	3,3 g	1,9 g	1,1 g	1 g	11, 5g
Vitamin D	1,2 IU	*	0,8 IU	*	*
Calcium	119 mg	79 mg**	125 mg**	110,7 mg**	*
Sodium	49 mg	36,8 mg	51,3 mg	29,5 mg	30,2 mg

*Nutritional analysis not performed
** Fortified with calcium

Table 1.
Comparison of the nutritional composition of cow's milk and plant-based beverages.[4]

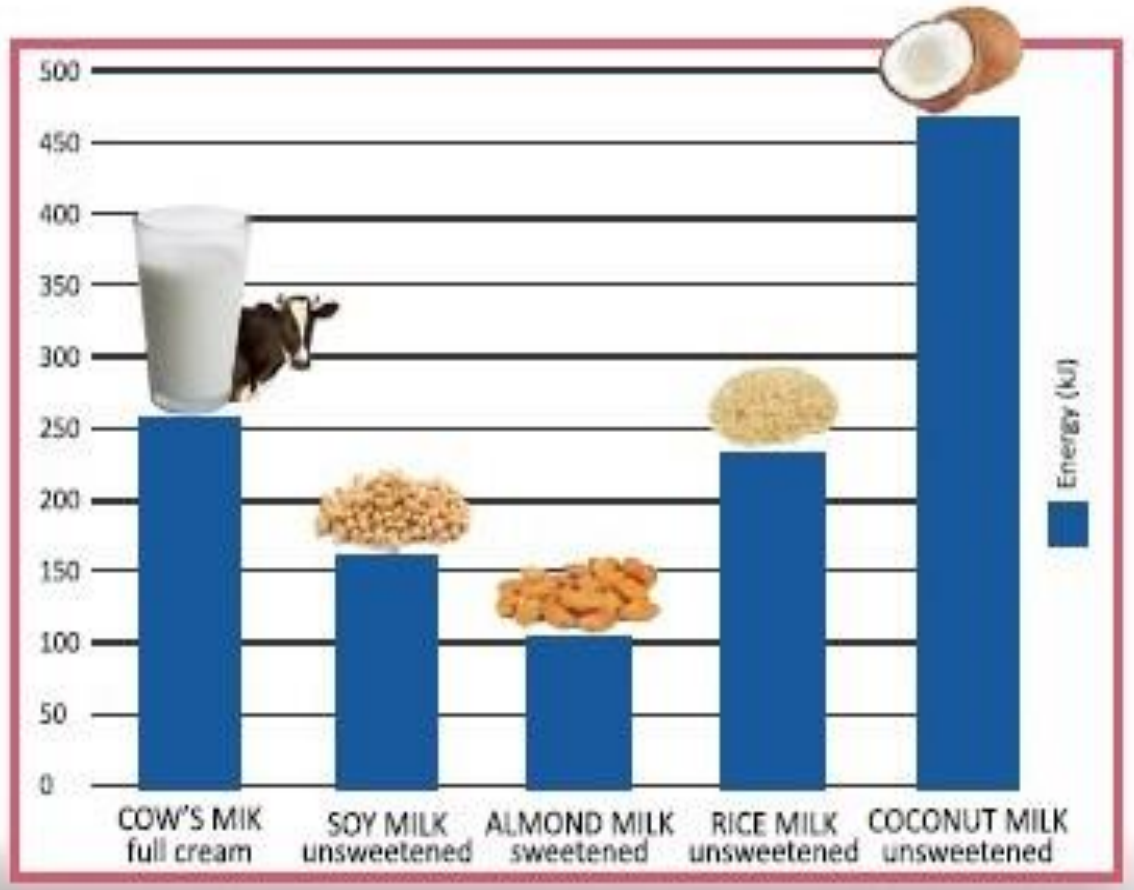
Graph 1.

Comparison of macronutrients per 100 g.



Graph 2:

Comparison of energy content (kJ) per 100 ml.



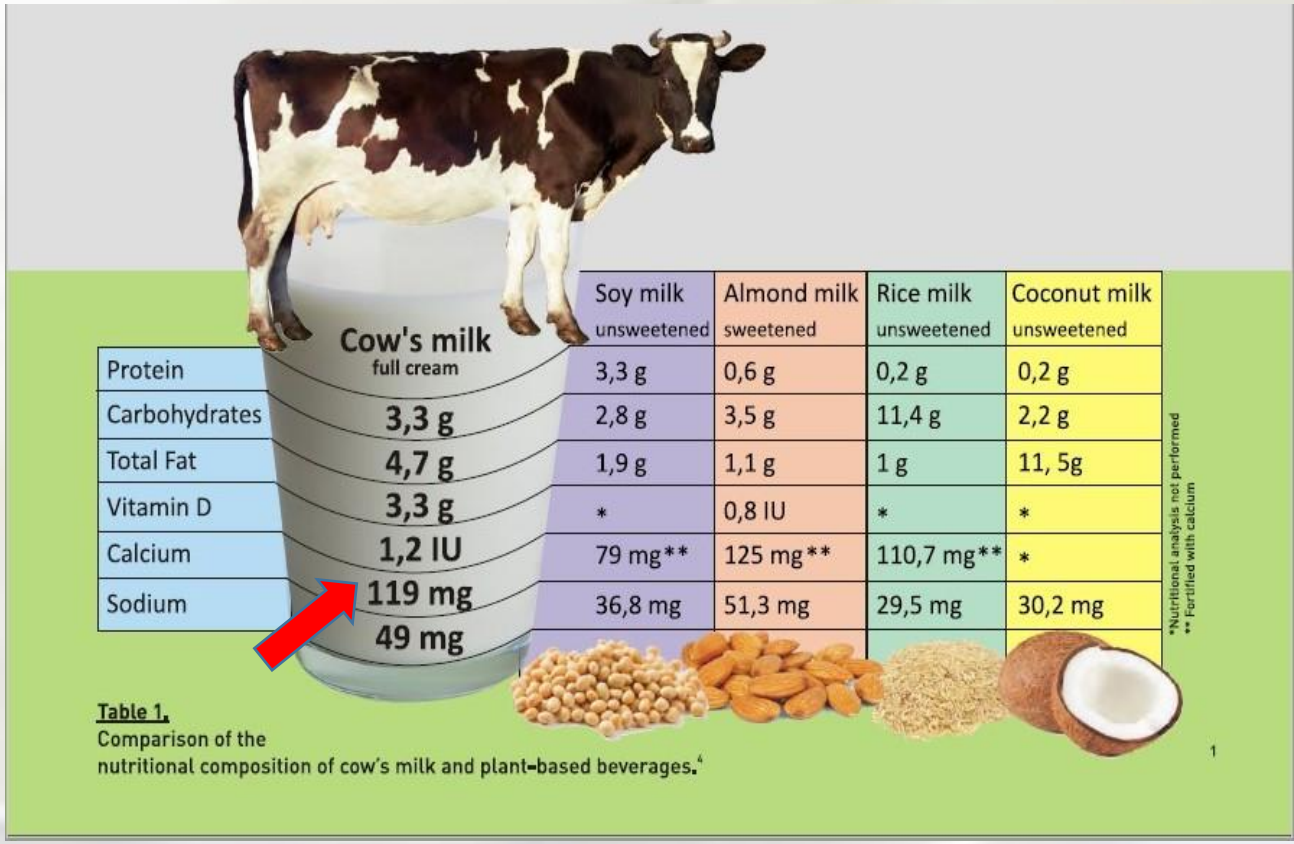
Fortification of non-dairy beverages with micronutrients cannot be considered nutritionally equivalent

Absorbability of the fortified substances influenced by physical state and interaction with food matrix

Concern is fortified calcium

Calcium in cow's milk highly bioavailable

Provides >1/2 of RDA in toddlers and young children



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What is the consequences of using substitutes?

A few concerns present themselves

- Lack of bioactive nutrients found in milk
- Risk of excess energy intake
- Bioavailability of fortified calcium
- Compensation for the low calcium intake

Dairy forms part of daily intake to meet calcium recommendations for skeletal development and maintenance of bone health

Dairy intake is essential for the accretion of peak bone mass during growth (protect against osteoporosis)

To reap benefit of serving a cardio-protective role

Milk alternatives do not contain adequate levels of Vitamin D

~3,000 pre-schoolers showed low vitamin D levels in 5% of children who drank only cow's milk, compared to 11% of children who drank only milk substitutes

Prolonged milk avoidance in children had lasting detrimental effects on height, weight and persistent osteopenia

Milk is an important iodine source in many countries

Iodine deficiency, especially during pregnancy, affects brain development

Iodine concentration of most cow’s milk alternatives such as soy and almond is very low

Iodine concentration tested in 47 milk substitutes

Most milk substitutes naturally low in iodine; ~ 2% of cows' milk

One glass of cows' milk provides ~70µg of iodine (150µg iodine recommended)

A glass of milk alternative provide ~2µg of iodine

Food and Drug Administration (FDA) does not have a definition for the term “natural” or “clean”

Congress has signed a letter urging the FDA to ban the use of the word “milk”

Group claims that nut and grain milks are imitations and should be labelled as such

2017, European Union Court of Justice stated that milk, cream, butter, cheese and yoghurt are reserved for animal products only

Arguments for and against the use of alternatives

COW'S MILK

ARGUMENTS FOR

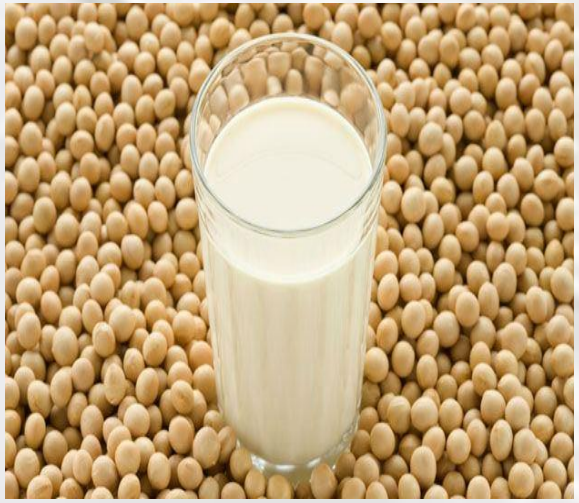
- Immune and inflammatory system support
- Improved bone mass
- Improved blood sugar regulation
- Reduced body fat
- Reduced CVD risk
- Lactose-free milk available

ARGUMENTS AGAINST

- Protein in cow's milk common allergen
- Lactose content

Arguments for and against the use of alternatives

SOYA MILK



ARGUMENTS FOR

- Source of protein, vitamin A, vitamin B-12, potassium, and isoflavones
- Little saturated fat

ARGUMENTS AGAINST

- Phytic acid
- Problem in case of thyroid disorders
- Low calcium and vitamin D
- Fertility problems and lower sperm counts
- Common allergen

Arguments for and against the use of alternatives

ALMOND MILK

ARGUMENTS FOR

- Low in calories and saturated fat
- High in vitamin A and E, Mn, Se, Mg, K and Zn
- Lactose free

ARGUMENTS AGAINST

- Low in protein
- Unfortified, very low in calcium and vitamin D
- May contain carrageenan

Arguments for and against the use of alternatives

RICE MILK

ARGUMENTS FOR

- Lactose free
- Least allergenic of milk alternatives

ARGUMENTS AGAINST

- Lowest nutritional composition
- Low in protein
- High in carbohydrates and GI
- Inorganic arsenic levels

Arguments for and against the use of alternatives

COCONUT MILK

ARGUMENTS FOR

- Contains MCT and K
- Does not increase cholesterol levels
- Rarely causes allergies

ARGUMENTS AGAINST

- Very low in protein
- May contain carrageenan

Dairy and sustainability

Nutrition

Low energy food which provide more nutrient/kcal

Provide highest calcium content plus high quality protein/monetary unit

Affordable

Socially acceptable

May be more acceptable than plant proteins to transitional populations

If modern farming practices are applied, dairy does not harm the environment

Environment

PPB and sustainability

Nutrition

High energy food which provide less nutrient/kcal

Provide low protein and low quality calcium/monetary unit

Affordable

Socially acceptable

May be acceptable in some populations, but less tasty

High impact on environment with regard to land, water and energy use

Environment

Conclusion

Commercially there are several plant based beverages that look like cow's milk, but differ considerably with regard to nutritional composition and bioavailability of nutrients

Dairy supports three of the pillars of sustainability very strongly, and current practices are in place to strengthen the fourth pillar

Conclusion

Replacing cow’s milk with plant based beverages may cause unintentional nutritional consequences

Hence plant based beverages should not be considered as a nutritional substitute for cow’s milk