

PROS AND CONS OF PLANT-BASED MILK ALTERNATIVES AND DAIRY BOVINE MILKS SOLD IN UK SUPERMARKETS

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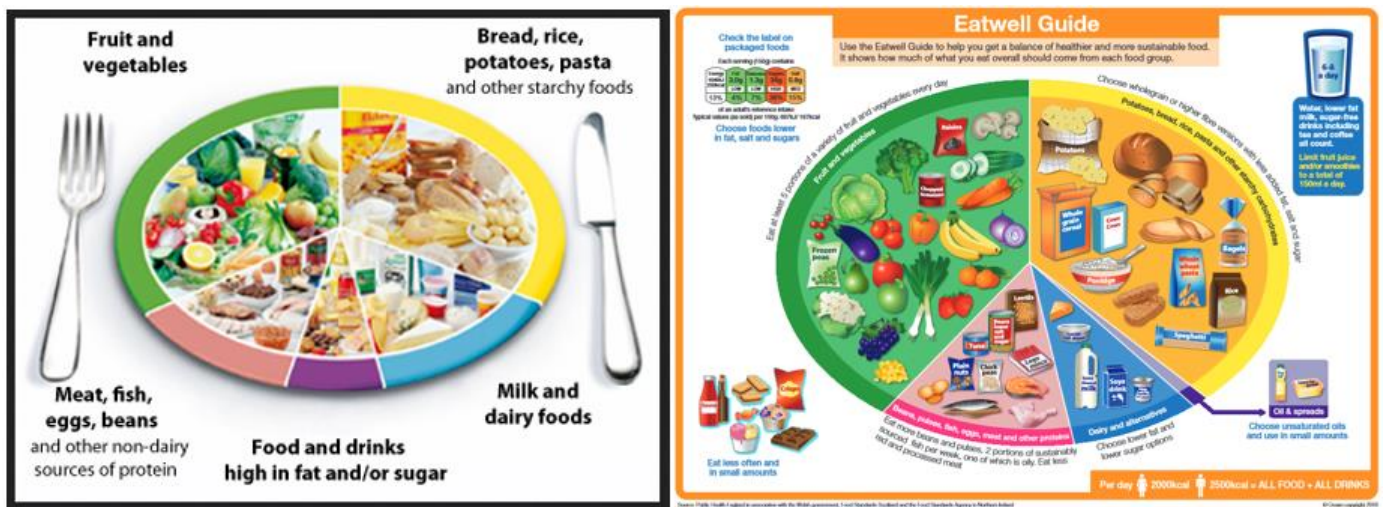
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Comparative summary of nutrient profile, usage and target population

Following a comprehensive analysis of the most popular commercially available plant-based milk alternatives and whole, semi-skimmed and skimmed bovine milk, it is concluded that plant-based and bovine milk nutrients vary considerably furthermore plant-based milks have substantial differences between themselves dependent on source and between brand.

This is of particular interest as the new Eat Well guide adopted by NHS Wales, now includes 'dairy alternatives', where in the past the sections were labelled 'dairy and milk foods'. Whilst this is a move to be more inclusive of those who eliminate animal products or actively aim to reduce such it may mislead consumers to believe that plant-based milks alternatives are straight swaps in both usage and nutritional composition.

Figure 1; Eat well guide changes post 2016



The choice of milk or milk alternative is largely dependent upon the overall dietary intake, goal, health status and dietary needs of individual. The varying nutritional values of both plant-based and dairy milks can be valuable in the emerging personalised nutrition markets where the need for multiple or singular nutrients are of importance. The selected plant-based milk alternatives contained a fibre content, opposed to dairy milk that does not. Dairy milks contain a complete profile of vitamins, including B12 and fat-soluble A, D, E and K. Plant-based milk largely relies on fortification to provide a vitamin. Similarly, with regards to minerals, dairy milks content is naturally occurring plant-based milk required fortification. The electrolytes balance in dairy milks are at a ratio ideal for hydration and cell transfer in all populations.

Plant-based milk alternatives may be recommendable to certain cohorts of adults as an addition to a varied balanced diet to improving health and all increasing nutrient intake. It is not possible to recommend a general plant-based milk as a replacement for bovine milk. This is due to the large variation of nutritional composition between brands and largely due to plant-based milk alternatives fortification processes. Larger variations occur even within the same source e.g. there is a large variation of the calcium composition in Alpro almond milk compared to Rude Health almond milk.

The UK has increasing population of consumers having too high an intake of saturated fat and sugar and insufficient intake of micronutrients and fibre. Considering current deficiencies and prevalence of diet -related disease certain plant-based milks may be suitable as health promoting dietary additions or partial accompaniment to cow's milk. For instance, the low saturated fat and high fibre content of oat and rice milks would be beneficial for individuals with gastrointestinal disorders or type II diabetes, who are looking for low glycaemic index foods.

The differing energy values pose positive and negatives to consumers dependant on age and health status. Whole dairy milk is energy dense and therefore a useful dietary staple in older adults and growing children. Hemp milk with its high essential fatty acids and low saturated fat content would be suitable for those aiming to improve their fat composition intake, while the almond milks generally provided the lowest in energy and therefore be suitable for those seeking a low-calorie alternative particularly with those following calorie restrictive diets.

Hazelnut milk is a micro-mineral rich alternative for those aiming to increase nutrient intake or coconut milk would be a suitable partial functional equivalent to cow's milk due to its fat and saturated fat content.

For those that want to cut down on animal-derived products it would be advisable to shop around and ensure that you are purchasing a product that is high in nutrients, fibre and contains a small level of saturated fat and unsaturated fatty acids to benefit from fat-soluble vitamins. B12 only occurs naturally in animal derived products it is believed that supplementation can be a source of delivery the bioavailability is not as high and therefore could lead to insufficiency over a long period of time. The UK population is largely deficient in omega three fatty acids, iodine and selenium all three can be found in bovine milk but not naturally occurring in plant-based.

Plant-based milks may contain varying levels of phytonutrients. phytonutrients are compounds naturally found within plants to protect plants from germs, fungi, bugs or other threats.

Plants, vegetables, nuts, seeds and grains contain phytonutrients, whilst they aren't essential for keeping for health like vitamins and minerals they have been shown to help prevent disease and enhance antioxidant activity. In plant-based milks it is assumed that levels will be low due to the soaking and filtering of solids however it is believed that trace amounts will still be present to provide benefits to health; this would

Further research is needed with the expansion on the variety and quantity of milks assessed to correctly advise a population on the nutritional differences and effects on health plant-based milk as replacements to cow's milk for individuals of different ages with differing health statuses. However, the research to date concludes that the choice of milk is very dependent on the individual's goals and needs.

Additional further research is required to establish if phytonutrients are retained during the processing of plant-based milk production, and if so what the content of phytonutrients are.

Table 1: summary of the most popular milks and there 'at a glance' positive and negatives at a glance to aid suitable selection for dietary implementation

Product	Positive	Negative
Whole milk	High in protein Moderately high in unsaturated fatty acids High energy density High in carbohydrates High in fat soluble vitamins High in vitamin B12 Contains vitamin D High in selenium and iodine	High SFA High in sugar Low in non-sugar carbohydrate
Semi skimmed milk	High protein- Higher than whole milk Moderately high in unsaturated fatty acids Low in saturated fat High in energy high in carbohydrates high in micro minerals e.g. Calcium, phosphorus, magnesium High in vitamin B12 High in selenium and iodine	High in sugar Low in vitamin D – although present Lower in fat soluble vitamins compared to whole milk
Skimmed milk	High in protein – not as high as semi-skimmed milk Moderate in energy High in carbohydrates High in minerals High in water-soluble vitamins Low in saturated fat	High in sugar Contains no fat-soluble vitamins No vitamin D Low B12 Low in unsaturated fat

Almond	High in calcium – due to fortification Low in saturated fat Mod effectively high in unsaturated fat Often fortified with vitamins D and B12 High in phosphorus – functionally equivalent to cow’s milk Many brands contain high-carbohydrate of which the majority are sugars similar to cows milk	Low in energy Low in micronutrients unless fortified Low in protein Naturally does not contain calcium, vitamin D or B12
Hemp	Low in saturated fat High in unsaturated fatty acids – particularly omega-3 Moderately high in micronutrients- Due to fortification Moderately high in energy Contains vitamins D and calcium – due to fortification High in fibre	No vitamin be 12 Low in carbohydrate Low in protein Low in micronutrients unless fortified Naturally does not contain calcium, vitamin D or B12
Rice	High in energy High in carbohydrates Low in sugar High in fibre Moderately high in unsaturated fatty acids Low in saturated fat Some such as rice dream is high in calcium and vitamin D and B12 due to Fortification	Low in protein Low in micronutrients unless fortified Naturally does not contain calcium, vitamin D or B12
Oat	High in energy High in carbohydrates Low in sugar High in fibre (inulin) Moderately high in unsaturated fat Low in saturated fat High in phosphorus	Low in protein Low in naturally occurring magnesium Low in micronutrient less fortified Naturally does not contain calcium, vitamin D or B12
Coconut	High in iron, calcium and phosphorus High vitamin D	High in saturated fat Contains very little unsaturated fatty acids Load magnesium Low in carbohydrate Low in protein
Hazelnut	Moderately high in energy High in unsaturated fatty acid Low in saturated fat High in iron and phosphorus Moderately high in carbohydrate Low in sugar	Low in magnesium Low in protein Low in micronutrients unless fortified

UK commercially available milks evaluated; Sainsburys Whole Milk, Sainsbury Semi Skimmed, Yeo Valley Semi Skimmed, Sainsburys Skimmed, Aproalmond, Almonds, Breeze, Good Hemp, Ecomil Hemp, Rude Health Hemp, Rude Health Rice, Rice Dream, Oatly Oat, Alpro Oat, Alpro Coconut, Chi Coconut, Ecomil Hazelnut, Alpro Hazelnut. Popularity was established by availability in UK supermarkets and ADHB data.

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Figure 1; NHS Wales 2019 Eat Well Guide <http://www.wales.nhs.uk/sitesplus/888/page/43758>