



Dairy products have no analogs, substitutes or imitations.

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Supporting the scientific merit of publications aimed at highlighting alleged similarities between milk and emulsions derived from seeds (soy, cashew, etc..) is an extremely risky practice from an ethical, lexical and scientific point of view. Even claiming the 'analogy' with milk, for example, suggested by definitions such as 'cashew nut milk' or 'soy milk,' would warrant hard opposition both scientifically and legally: this is also the result of the damage in terms of information caused to consumers, who in the term 'analogy' identify a nutritional equivalence between products of extremely different nature and value. It is even more inappropriate to speak of 'cheese analogs' when referring to curds of various plant and biotechnological derivatives for which the term is misused. There is a furtive attempt to impose this terminology, given that there is already an equally furtive effort to use the term 'milk' in combination with raw materials that have no biological analogy with milk, not even when it comes to the basic properties, even considering the chemical, physical and nutritional characteristics.

To introduce readers to the issue of ***fake science*** that many are attempting to legitimize in Europe as well, an example was cited at the beginning of this article, taken from a publication by an extremely respected publisher and produced with the cooperation of scientific institutions in Nigeria and South Africa.

The attempt to justify the use of the terms 'milk' and 'cheese' even reaches the point, in the example considered, of presenting analytical data concerning soy and cashew nut 'curds' (called cheese analogs): the data concern humidity, ashes, proteins, crude fiber, total lipids, and carbohydrates. A nutritional assessment based on overall data such as these is absolutely inadequate for us to establish any analogy of dairy products with the curds that a certain market segment wants to pass off as 'analogs.' We find it inappropriate to discuss comparative data, because even the most biased expert is not in a position to draw parallels of any kind between real dairy products (in this case, cheese) and those called 'analogs'. Reconsidering the issue of terminology, and in order to protect terms that are now commonly used, suffice it to mention that in 2017 the European Union prohibited the use of the words 'milk,' 'cheese,' 'butter,' and 'yogurt' for non-dairy products.



There are several biological considerations that can be made to affirm that the term ‘analogs’ cannot be used to identify ‘curds’ from vegetable sources and to create a parallelism with milk derivatives: the most obvious difference concerns protein synthesis and in particular DNA, the organic structure that governs protein synthesis and is contained in the nucleus of all cells. By encoding species-typical genetic information through RNA, the genetic message is passed on to other cells, thus enabling protein synthesis characteristic of the species of origin. Quite simply, milk proteins derived from the producing species are based on a logic of biosynthesis that is unquestionably differentiated. If one believes that this is not enough to conclude that the claim of ‘analogy’ between milk and liquids of other origin resulting from technological processing carried out on vegetable matter is groundless, it would be sufficient to consider that ‘de facto’ vegetable proteins lack essential amino acids in differentiated quantitative terms. For the record, biology defines those amino acids that can be taken in via food and are not synthesized by the human body as ‘essential.’ On the other hand, milk contains a broader range of essential amino acids and provides lactalbumins and lactoglobulins (whey proteins) that have an amino acid profile comparable or even superior to that of egg proteins in biological and nutritional terms. In addition, immunoglobulins in milk exert an immune action and provide growth factors, protein hormones, and branched-chain amino acids. One fundamental characteristic that differentiates milk proteins from those derived from vegetables is also the capacity of milk proteins to provide phosphorus, calcium and magnesium.

What makes the term ‘cheese analogs’ unacceptable is also rooted in the biochemistry of the formation of aromatic compounds, which is a peculiar characteristic of milk derivatives during ripening. Moreover, both the structure and the aroma of cheese are the result of a complex microbial activity carried out by lactic microorganisms, from which proteolytic and lipolytic enzymes are derived. The formation of free fatty acids is therefore possible, with fundamental consequences on flavor, as a result of secondary lipolytic activity, as well as of the lipolytic activity due to milk lipase. This mechanism is typical and exclusive of milk and not of other ‘substitutes,’ leading to the formation of short-chain fatty acids. This group of short-chain fatty acids is responsible for many nutritional characteristics that are also absent in ‘alternative’ curds or so-called ‘analogs’ today. In order to have ‘fatty’ structures to be used in ‘analogs,’ vegetable matter that should be classified as derivatives of actual chemical synthesis is also used. Meanwhile, palm oil and other fatty acid substitutes appear to produce more pro-inflammatory markers than saturated fatty acids from dairy products do. This was highlighted in a 2016 paper by Demmer.



Alternative terms to 'analogs' that are less misleading are 'imitation products' or 'substitute products.' Also given that for the production of 'alternatives' to dairy products there is a tendency to use vegetable rennet, rennet produced from artichoke thistle or legumes fermented with commercial yeast, with the addition of tapioca flour, is used to make imitation products.

In the search for new protein sources to use, the 'cost' factor is becoming increasingly relevant, and the use of cereals enriched with legumes seems to be a reasonable solution. But different solutions are already on the horizon: lab-grown proteins and proteins from microalgae. Bryant and Barnett recently predicted that, in addition to ice cream and yogurt prototypes, the future holds the prospect of using unconventional protein sources to produce 'cheese' prototypes. By means of microbial cultures, it is believed that proteins that can be considered alternatives to milk proteins will be available, and this will mean another dangerous attempt to destabilize the market.

The protection of consumers who prefer 'natural' products risks being upset by the entry of PBCAs (plant-based cheese alternatives) on the market: these 'novel' foods are advertised as 'natural,' but what is really natural about them? What makes them unnatural lies precisely in the fact that they substitute well-defined proteins with specific properties with protein materials with different properties that nature has never used: there is nothing more conceptually unnatural.

This is not the place for some to argue a possible 'fight' against 'vegan' principles. Freedom of access to food is sanctioned by history, but there is no reason why the freedom to support the nutritional value of traditional foods not appreciated by vegans, foods which have made the history of humankind, should not be respected as well: defending the intrinsic value of a food also means avoiding that their possible substitutes are presented as an equivalent alternative to the food whose analog is being claimed to be produced.

Looking at the offering of dairy substitutes, we find the use of raw materials that obviously no one would ever consider as having a nutritional value with biological properties remotely comparable to those of genuine dairy products. This clearly excludes any possibility of adopting the term 'assimilation.' For example, we are seeing the use of fermented soy extract associated with fats such as coconut and sunflower oil (to produce a spread?), combined with thickeners such as carrageenan and alginate, or sprouted brown rice associated with fats such as coconut and sunflower oil and thickeners such as agar-agar, gum arabic, xanthan gum, carob bean gum to produce a stracchino cheese (?), or potato starch with chickpea flour associated with coconut oil (to produce an aged cheese?), or making mascarpone with sprouted brown rice to be used in a confectionery that is of no delight to anyone. Let us not forget the sliced cheeses made with sprouted brown rice, coconut oil (be sure.... cold pressed!), lemon juice and thickeners.



But these examples are just a part of the picture of bad R&D and bad sensory experience that they are trying to present to honest consumers who want at least to respect the use of terms now present in the dictionary. The flaunting of the presence of a diverse quality of additives seems to respond to a logic far removed from the one which the formulators of the new creed are pursuing.

Moreover, in our opinion, the spasmodic search for systems of senseless assimilation of 'curds' to materials that the dairy industry has been offering with great care for years to attentive consumers who wish to purchase nutritional value is deplorable.

In conclusion, with inadequate and scientifically groundless terms, the market of those products that are seeking to acquire the image of 'analogs' is relying on the lexical 'help' of the consolidated names of milk derivatives to create an image for proteins of all kinds.