

# Message in a bottle

It's ubiquitous and sold as the next best thing to mother's love and apple pie. But just what's in your daily pinta? Dr Justine Butler investigates

**W**e are a nation of milk drinkers and most infants, children, adults and old people consume large quantities. It is used to produce cheese, butter and yogurt and is made into thousands of products and if you criticise it, your sanity is questioned. But is milk really a wonder food or is it doing us more harm than good?

Milk is the first food we consume – our mother's if we're fortunate. It's a wholesome part of the diet associated with comfort and nurturing but while all other mammals are weaned off milk early in life, most humans in the West continue drinking it and not just that, the milk of a different species – cows.

So what nutritional value does it have? The science is conflicting, with some reports suggesting it is beneficial but an increasing amount of evidence now links cow's milk to a whole range of health problems, including some of the UK's big killers such as heart disease, obesity, type 1 diabetes, breast cancer and prostate cancer. Milk and dairy products are also linked to Crohn's disease, osteoporosis, childhood allergies – especially eczema – and even teenage acne.

The main carbohydrate in milk is a sugar called lactose, which needs to be broken down in the intestines by an enzyme called lactase before it can be digested. Most infants can digest lactose but only until they're weaned, after which they become 'lactose intolerant'. This applies to most people in the world, with almost 100 per cent of Asians being lactose intolerant, 65-70 per cent of Africans, but just 10 per cent of Caucasians (1). It follows that on a global scale, not drinking milk is the norm.

There are big differences between human milk and cow's milk, not least in the protein content – cow's milk containing more than twice as much as human milk and of a very different type.

Milk from both species contains casein and whey proteins but in human milk the ratio is 40:60 while in cow's milk it is 80:20. So there is much more casein in cow's milk and it's extremely tough – so tough it was traditionally used to make furniture glue! Not surprisingly, it can be difficult to digest and is the most common source of food allergy in children.

One of the reactions can be intestinal bleeding, with a considerable amount of iron being lost with the blood (2). Frank Oski, former paediatrics director at Johns Hopkins School of Medicine, estimates that this allergic reaction causes half the cases of iron-deficiency anaemia in US infants (3). This is a staggering figure considering that over 15 per cent of infants under two suffer from the condition.

There is also convincing research showing that drinking cow's milk in infancy and adolescence – and this includes cow's milk infant formula – may be a trigger for type 1 diabetes in some people (4, 5). It is thought that casein and other molecules trigger a kind of chain reaction that ends with the destruction of cells in the pancreas – the cells that produce insulin.



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It's glaringly obvious that the type of milk an animal produces reflects the nutritional needs of its babies. In human babies, the brain develops rapidly, tripling in size by the age of one and the high levels of polyunsaturated fatty acids (PUFAs) in human milk are responsible. Cow's milk contains fewer PUFAs than human milk because rapid growth in body size is more important for cows than brain development – hence the higher levels of body-building saturated fats in cow's milk.

What saturated fats do to humans is increase cholesterol levels, which in turn increase the risk of heart disease and strokes by building up fatty deposits known as plaques in the arteries. Whole milk, butter, cheese, cream and ice-cream all contain high levels of saturated fat, which are also linked to obesity and type 2 diabetes.

It also follows that the vitamin and mineral content of cow's milk is out of balance for humans – its four times greater calcium content is designed to fuel the rapid growth of a calf's skeleton. The fact that humans don't absorb calcium from milk as well as they do the calcium in plant foods is an indication of what we should be eating (6).

Cow's milk contains very little iron, which is one of the reasons why it is seen as unsuitable for infants. A one-year-old who wanted to meet the Government's recommended daily intake of 5.3mg of iron would have to drink 30 pints of the stuff.

Cow's milk is also low in vitamin C and vitamin D (7) and contains less vitamin A than human milk. The high protein, sodium, potassium, phosphorus and chloride content of cow's milk can place a strain on immature kidneys, forcing them to draw water from the body and so increasing the risk of dehydration.

It gets worse! The modern dairy cow is prone to stress and disease, with mastitis – an inflammation of the mammary glands – affecting 50 per cent of cows every year (8). In response to the infection, the cow's immune system produces somatic (pus) cells which are then excreted in the milk – the milk people drink! EU regulations allow a maximum limit of 400 million somatic cells per litre of milk (9). So one teaspoonful of milk could contain up to two million pus cells!

There has been a growing trend for low-fat milk and dairy products for supposed health reasons but this type of milk is also linked to a range of illnesses and diseases, which suggests that something in milk other than fat is responsible. The suspected guilty parties which are attracting scientific attention are a wide range of so-called 'bioactive molecules', which include both hormones and substances called 'growth factors' (10).

Again, it's important to remember that cow's milk is from a different species and is geared to the nutritional needs of

calves. Just like us, cows don't produce milk unless they've recently given birth. Dairy cows are artificially inseminated every year and their pregnancy lasts nine months. Two days after birth, the new-born calf is taken from his or her mother and her milk is taken for human consumption.

Within two months of giving birth she is impregnated again yet milking continues until the last two months of pregnancy. So, for seven months, she is lactating and nurturing a growing calf inside her. This cycle continues until she is worn out, at around three pregnancies, and killed.

All milk contains hormones and growth factors and the level in a dairy cow varies hugely, depending upon whether she is pregnant or not and the stage of the pregnancy. At least two-thirds of all cow's milk in the UK comes from pregnant animals (11) and is causing particular concern to some researchers because of its oestrogen content (12). The likelihood is that cow's milk is one of the major sources of oestrogens in humans.

The second big concern is over something called 'insulin-like growth factor 1' (IGF-1) which occurs naturally in the blood of both cows and humans and particularly in their milk. It has been linked to several cancers. The concern is that its molecules may not be broken down during pasteurisation or digestion, pass through the intestinal wall and be absorbed into the blood. It's known that this happens with another, different growth factor (13) and is likely to be the same with IGF-1.

The outcome could be that on entering the blood, cow's milk IGF-1 adds to and increases the body's normal level. Because it regulates cell growth and division the fear is that it may cause human breast cancer cells to grow – which is what has happened in laboratory studies. Even a small increase in levels of IGF-1 in the blood is linked to a higher risk of prostate, breast, colon and lung cancer (14).

Studies have shown that IGF-1 levels are higher in people who consume milk and dairy products (15, 16, 17) and one of them actually put some figures on it. Increasing the amount of cow's milk drunk from 200 to 600ml a day produced a massive 30 per cent increase in IGF-1 in the blood (18).

What isn't yet clear is whether this increase is caused directly by cow's milk IGF-1 crossing the gut wall or for other reasons. Whichever, the research is clear that cow's milk and dairy products increase levels of IGF-1, which in turn increases the risk of various cancers.

Milk is a food that nourishes baby mammals and to do so it carries signalling molecules made up of hormones and growth factors. They carry the messages from mother to infant, directing its immune and other systems, enabling it to grow up healthily. It is for this reason that cow's milk is perfect for calves but is not at all suitable for us.