



## **Lactic acid bacteria - their uses in food**

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Lactic acid bacteria have been used to ferment or culture foods for at least 4000 years. They are used in particular in fermented milk products from all over the world, including yoghurt, cheese, butter, buttermilk, kefir and koumiss.

Lactic acid bacteria refers to a large group of beneficial bacteria that have similar properties and all produce lactic acid as an end product of the fermentation process. They are widespread in nature and are also found in our digestive systems. Although they are best known for their role in the preparation of fermented dairy products, they are also used for pickling of vegetables, baking, winemaking, curing fish, meats and sausages.

Without understanding the scientific basis, people thousands of years ago used lactic acid bacteria to produce cultured foods with improved preservation properties and with characteristic flavours and textures different from the original food.

Similarly today, a wide variety of fermented milk products including liquid drinks such as kefir and semi-solid or firm products like yoghurt and cheese respectively, make good use of these illustrious microbial allies.

The manufacture involves a microbial process by which the milk sugar, lactose is converted to lactic acid. As the acid accumulates, the structure of the milk protein changes (curdling) and thus the texture of the product. Other variables such as temperature and the composition of the milk, also contribute to the particular features of different products.

Lactic acid also gives fermented milks their slightly tart taste. Additional characteristic flavours and aromas are often the result of other products of lactic acid bacteria. For example acetaldehyde, provides the characteristic aroma of yoghurt, while diacetyl imparts a buttery taste to other fermented milks. Additional micro-organisms such as yeasts can also be included in the culture to provide unique tastes. For example, alcohol and carbon dioxide produced by yeasts contribute to the refreshing, frothy taste of kefir, koumiss and leben. Other manufacturing techniques such as removing the whey or adding flavours, also contribute to the large variety of available products.

For yoghurt, the manufacture depends on a symbiotic relationship between two bacteria,

*Streptococcus thermophilus* and *Lactobacillus bulgaricus*, where each species of bacterium stimulates the growth of the other. This interaction results in a shortened fermentation time and a product with different characteristics than one fermented with a single species.

With yoghurt and other fermented milks there are considerable opportunities for exploiting lactic acid bacteria as probiotic cultures. These supplement and help our normal gut bacteria to function more efficiently. The world-wide market for these products continues to increase in response to the demands of an increasingly health-conscious public.

Lactic acid bacteria are therefore excellent ambassadors for an often maligned microbial world. They are not only of major economic significance, but are also of value in maintaining and promoting human health.