

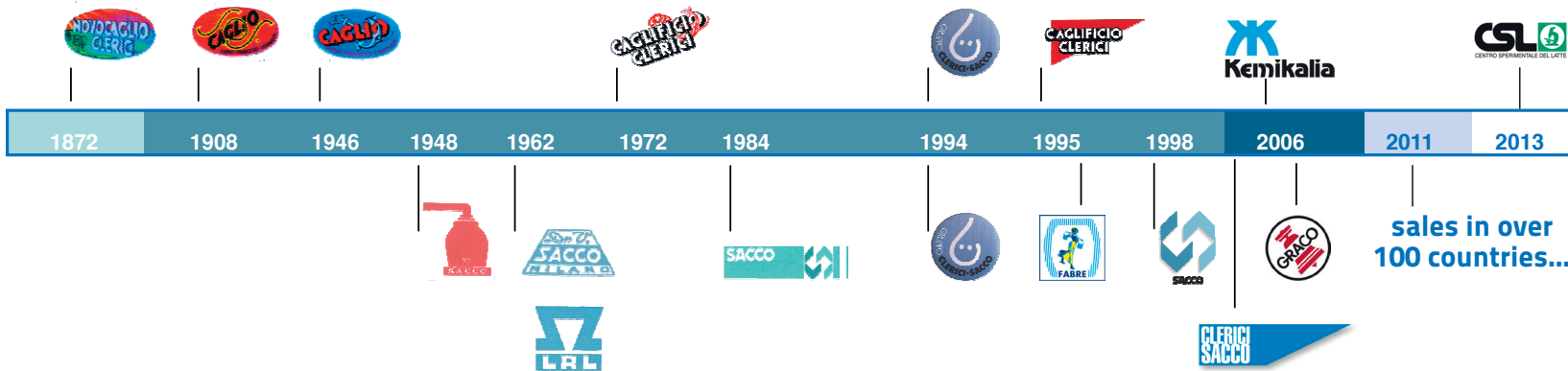
**CLERICI  
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**CLERICI  
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**Added quality  
and safety  
in meat  
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2013



*Experience and  
tradition in starter  
culture production*

## Food matrix

In all non-sterile food products there will be indigenous bacteria unpredictably consisting of spoilage, pathogenic and harmless bacteria. The types of bacteria present depend highly on type of food matrix, processing and storage temperature. By vacuum-packaging or modified atmosphere packaging will primarily Gram-negative bacteria be inhibited, and therefore, the problematic flora in such products consists of lactic acid bacteria (LAB); such as gas-producing LAB, LAB producing acetic acid/sourness, *Brochothrix* giving off-flavour, and slime-producing *Leuconostoc*. Furthermore, also *Listeria monocytogenes* is able to grow under these conditions imposing a safety hazard.

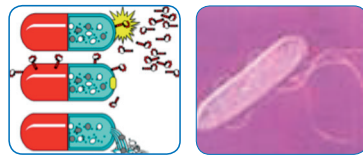
Both presence of spoilage and pathogenic bacteria result in huge economical losses due to discharged food and food-poising. The majority of bacteria are harmless, some even helpful, but why count on uncontrolled indigenous bacteria when dominant and undamaging starter cultures are on hand?

## Protective meat starter cultures

Starter cultures are beneficial and safe bacteria added for various purposes depending on the application. "Protection with starter cultures" is the term used when the sole purpose of a culture is to control and suppress undesirable indigenous bacteria and hereby enhance the quality and safety of food products and not for technological functions. This is called competitive exclusion.

Protective cultures for cold-stored meat products should be able to grow and be competitive at low temperatures, because at this point, the indigenous flora will develop. Furthermore, protective cultures should not change the sensory properties of meat products considerably.

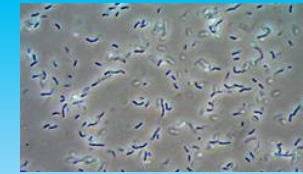
During growth these starter cultures are advantageous because they produce beneficial components such as enzymes and metabolites. Some cultures also produce bacteriocins, which are antibacterial peptides influencing the growth of related bacteria. Fortunately *L. monocytogenes* is susceptible to LAB bacteriocins, and consequently, bacteriocin producing cultures will be an additional hurdle enhancing safety.



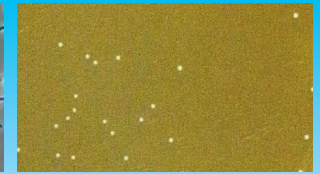
Protection with Sacco cultures for meat application can be achieved by

- Competitive exclusion with *Lactobacillus sakei* efficiently inhibiting a range of bacteria being able to spoil vacuum-packed and modified atmosphere packed meat products utilised in Lyoflora BOM-13, BXH-12 and BXH-69.

- Bacteriocin producing *Carnobacterium* culture "only" active against *L. monocytogenes* available in Lyoflora FP-18.



*Lb. sakei*



*Carnobacterium* colonies

- Combination of both principles, in Lyocarni BOX-74 and BMX-37, being the most valuable system.

In meat products added a protective culture it is to be expected that the level of bacteria initially will be higher compared to a product without culture added, which is to ensure the dominance by the starter culture. Nevertheless, over time the amount will even out. How fast the same level of bacteria will be found in products with and without culture added depends predominantly of the meat matrix and the storage temperature. The big difference is, that by adding a protective culture the indigenous bacteria will be controlled by this culture, and therefore, it is a well-known flora growing in the meat products enhancing quality and safety.

Protective cultures can be used in/on all types of meat products except in whole cured, dried muscles and salami, in which other starter cultures are more beneficial.

## Sacco has protective cultures for

- Application in fresh meat products, such as fresh sausages and minced meat with nitrite salt added, the cultures BXH-12, BXH-69 and BMX-74 are recommendable due to the advantage of staphylococci present in these cultures.
- Application in fresh meat products without nitrite salt added or on cooked meat products after cooking and cooling, such as emulsion sausages and sliced meat products, the cultures BOM-13 and BOX-74 are recommendable.

## APPLICATION IN MEAT PRODUCT

