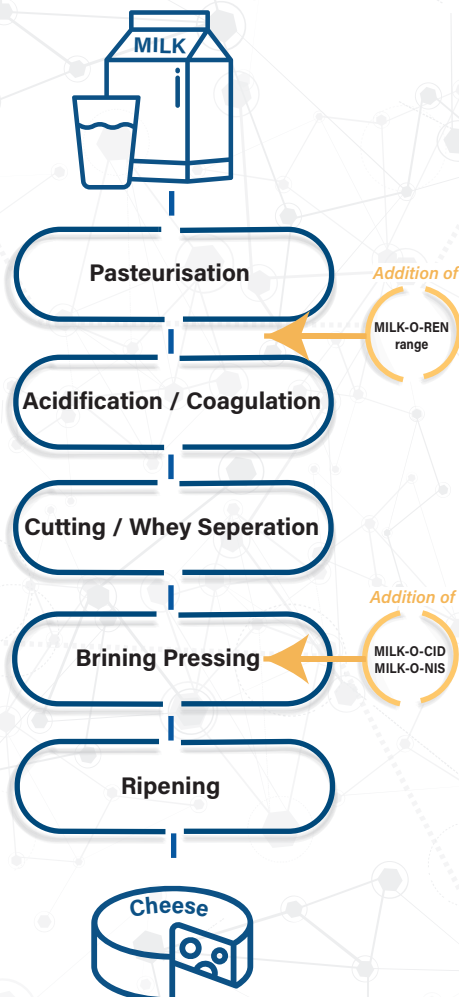


MILK-O® FOR DAIRY PROCESSING AND PRESERVATION

Acceleration of Milk Coagulation

Cheese starts its journey as animal milk, primarily cow's milk for harder cheeses, with certain cheese types produced from sheep and goat's milk. The cheesemaking process sees the animal milk go through various stages and processes in order to solidify the milk to the specific cheese type's needs. The harder the cheese type the greater the requirement for the milk to solidify. This process can be accelerated through the use of enzymes. Rennet is traditionally an animal-derived enzyme, and is a combination of enzymes, primarily the proteolytic enzyme chymosin that can be used to solidify the milk. Our range of **MILK-O®-REN** products are natural microbial

rennet preparations derived from *Rhizomucor miehei* improving the continuity of supply whilst making them suitable for products where Kosher and Halal certified processing aids are required. **MILK-O®-REN** can be added following the pasteurisation of the animal milk to aid the coagulation step. Rennet works by digesting the casein protein within the milk to remove the negatively charged end of the casein protein chain (responsible for maintaining milk's liquid state). These are then removed with the liquid whey and the remaining casein molecules start to join together, coagulating to form the curd to form hard cheeses.



Natural Preservation Solutions for Dairy



Prevent growth of undesirable microorganisms



Prevent late-blowing defects



Protect against spore-forming bacteria

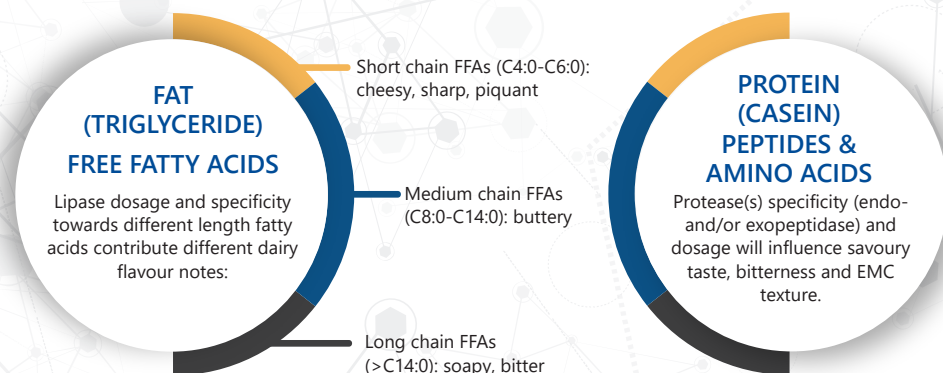
Microbes can grow on the surfaces of cheese causing spoilage. Preservatives such as natamycin, nisin and lysozyme can be used to protect the cheese and prevent the growth of yeasts and moulds. When added to the brining and pressing stage these natural preservative solutions can protect the surfaces of cheese and the brine baths against growth of spores, as well as continued prevention following the cheese ripening process.

MILK-O®-REN | **MILK-O®-CID** | **MILK-O®-NIS** | **MILK-O®-LYS**

BIOCATALYSTS' RANGE OF PRODUCTS FOR DAIRY PROCESSING

Enzymes Used to Modify Dairy Substrates for Flavour Generation

Dairy substrates contain fats and proteins that can be modified using enzymes to enhance dairy flavours. Different combinations of lipases (**Lipomod**[®]) and proteases (**Promod**[®]) from Biocatalysts range of products can be used to hydrolyse the fats and proteins to develop unique flavour profiles to be used in the production of dairy ingredients.



Enzymes Used for the Hydrolysis of Dairy Proteins

Milk contains two primary protein groups, casein and whey. During the manufacture of cheese, the liquid whey separates from the 'curd' or coagulated casein. Whey protein is a popular choice for use in sports and clinical nutrition products due to it being a high-quality protein, which is efficiently absorbed and is a rich source of branched chain amino acids such as isoleucine, leucine and valine, for repairing and building muscle following exercise. Casein protein is rich in branched chain amino acids (BCAAs), unlike whey, casein is a slow-digesting protein and therefore its role in nutritional products differs. The lower amino acid absorption rate of casein makes it a significant protein for elderly nutritional products to assist with recovery and reduce muscle breakdown. The unique proteolytic activities of endopeptidase and exopeptidases deliver added value and functionality in terms of degree of hydrolysis (**Promod**[®]) to improve the digestibility, allergenicity and solubility of dairy proteins and the enhancement of flavour of the dairy hydrolysates (**Flavorpro**[®]).



Enzymes for Lactose-Free Dairy Production

Most dairy foods, including those produced from milk from cows, sheep and goats contain the natural sugar lactose. In addition to dairy proteins this natural sugar is one of the main components of animal-milk derived products that individuals have an intolerance or allergy to.

Lactase enzymes (**MILK-O[®]-LAC**) can be used to breakdown the lactose that is present in dairy milk into the sugars glucose and galactose which are two much more easily digestible sugars. Hydrolysis of the lactose in dairy products can also improve the solubility and generate a sweet flavour.

MILK-O[®]-LAC

Liquid neutral B-galactosidase (lactase) derived from *Kluyveromyces lactis*, for lactose hydrolysis for production of lactose-free dairy production.

MILK-O[®]-LAC BL

Liquid neutral B-galactosidase (lactase) derived from *Bifidobacterium brevii*, for lactose hydrolysis for production of lactose-free dairy production.

