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# Development of Probiotic Indian Cheese using Rennet by Potential Microbes Isolated from Natural Sources

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## ABSTRACTS

Rennet is an exogenous enzymes used in dairy processing industries and food sectors. Rennin acts on the milk protein in two stages, through enzymatic and non-enzymatic action, resulting in the milk coagulation. Traditionally, the enzyme is extracted from whole abomasum of ruminants. Microbial rennet contains enzymes having a high ratio of milk clotting activity and proteolytic activity. This review aims to explore techniques of microbial production, characterization and cost benefits over current technologies used in dairy industries. Among the dairy product, cheese is a major choice for consumption with high nutritional values and probiotic activity. Cheese is a nutrient dense dairy product providing essential biomolecules such as proteins, minerals, fats. The viability of probiotic microorganism in cheese is high as found in other dairy product and shelf life is extended as compared to with other alternatives of production. The manufactured probiotic cheese have certain benefits over traditional cheese production processes.

*Key words: Probiotics, Cheese, Microbial rennets.*

## Introduction

In dairy processing industries cheese found is on the top of the foodstuffs with providing nutritional value and probiotic activity. In cheese production the major enzyme required for clotting of milk is rennet. Traditionally rennet is extracted from whole abomasum of ruminants. The current technological advancement in microbial enzyme extraction and purification of rennet and dairy cultures with their applications provides new era in food processing industries (Phillips Theresa, 2019). Apart from the proteolytic enzymes, the produced rennet contains some lipolytic enzymes with extended special sensory characteristics (Kevany Soodam *et al.*, 2015). The fermented dairy products contains probiotic organisms. The viability of probiotic organisms in

cheese as well as the main factors influencing their stability during processing and storage. Currently, cheese production and its quality is affected by the genotypic and phenotypic characteristics of microorganisms, the chemical and microbiological properties of milk, and processing. An important factor cheese production is rennet, because they affect chemical processes during production and ripening. Enzymes acts as biocatalysts for all the metabolic activities. They accelerate the rate of reaction with respect to lowering the activation energy.

Probiotics are the living microorganisms that beneficially affects the host's health by improving its microbial balance. The probiotic cell incorporation in fermented cheese increase higher buffering capacity, greater fat content with high nutritional benefits. Some factors influences activity of probiotic micro-

organisms are salt concentration, food additives, temperature, pH, storage period etc.

The probiotic cheese having some specific sensory characteristics, including flavor and aroma. The characteristics of a good cheese depends on its nutritional content including fatty acids, amino acids, aldehydes and alcohol. Some physical factors are responsible for cheese making process includes climate, regional conditions, geographical position, techniques used Likewise ripening conditions, microorganisms associated with rennet and cheese production affects quality of good cheese. Metabolic process involved in cheese production are glycolysis, citrate utilization, proteolysis, and lipolysis,

### Isolation and Techniques of Rennet Production

Rennet Peptidases are a group of enzymes with wide applications such as in food, beverages, medicines, detergents, the production of chemicals, leather, paper, and textile processing industries. Milk-clotting enzymes such as rennet is useful in cheesemaking are aspartic proteinase. Endopeptidases cleave peptide bonds in the inner parts of their polypeptide chains, away from the N- and the C-terminus. Peptidases are distinguished by the functional group in their active site: (A) for aspartate, (C) for cysteine, (G) for glutamic, (M) for metallo, (P) for mixed, (S) for serine, (T) for threonine, (N) for asparagine lyase, and (U) for as-yet unclassified peptidases of unknown catalytic type. Peptidases are mainly found in plants, bacteria animals, fungi etc. The group of peptidase enzymes and the proteins that inhibit them. In addition to this classification, depending on the functional group in the active peptidase site, peptidases are additionally classified according to the specificity of certain amino acids ("sequence specificity"), which form sensitive peptide bonds. Rennet consist of class of chymosin and pepsinases enzyme obtained from abomasum of calves, lambs and caprins. Chymosin is a neonatal peptidase that are secreted in the stomach cause coagulation of milk to increase the nutritional value during retention in the intestine of ruminants, this allows young animals to utilize more nutrients. In milk addition of rennet enzymes hydrolyses casein.

### Probiotic microbial cultures

*Lactobacillus* and *Bifidobacterium* spp. are the most common strains used in cheese production. Some of the most relevant probiotic culture production and viability in Cheese is most promising aspect in dairy

processing industries. The starter culture which is used in cheese manufacturing process develops desired metabolic activities during fermentation process which results in increased characteristics mainly nutritional value, texture, colour preservation taste, health benefits.

Probiotic microorganisms of intestinal origin exert health benefits. During cheese processing, a survival behaviour of new strains are checked with respect to effects on carbohydrates, proteins, and fats content (Assefa Bezie, 2019). The survival behaviour of probiotic microorganisms in gastrointestinal conditions aims to good metabolic behaviour and antioxidant activity. Some techniques have been developed to enhance the viability of probiotic bacteria in cheese including the selection of oxygentolerant, acid-tolerant, and bile-resistant strains (Yerlikaya Oktay, 2014). The good sensory characteristic without change in texture and aroma improves market of cheese in food sectors. To overcome with the problems during processing to keep in mind that the properties of particular strain, processing and storage condition to be checked. Fermented cheese shows better buffering capacity for probiotics, less water activity, ripening period storage temperature.

### Cheese Making

Probiotics Cheese manufacture is essentially a dehydration of milk combined with other preservative effects, such as culturing, salting, packaging, ripening, and/or storage. The addition of probiotic bacteria and their viability during processing is depends on milk culturing, inoculation and cheese processing (Widyastuti *et al.*, 2014). In large scale cheese manufacturing process starts with pasteurization of milk (73 °C for 15 seconds). Thermal milk treatment is a hyperbaric treatment through high pressure homogenization was traditionally used an alternative for pasteurization. The addition of increasing amounts of probiotics for preparation is the second step in processing. Cheese using *S. thermophiles* as a starter and probiotic lactobacilli were conventionally used. The viability and metabolically active probiotic bacteria without affecting sensory properties are to be selected (Kongo, 2013). Analysis of processed cheese shows proper microbial viability, low pH, greater production of organic acid and lower scores of aroma, texture and appearance. Some negative properties have been reported that the handling and heating processes, viability rate etc.

## Conclusion

In dairy processing industries cheese processing is impressively increasing. The worldwide the market of milk and milk product becomes increasing meanwhile the demand of microbial enzymes used in processing also increases. In the preparation of cheese the coagulation milk is important step to accelerate dehydration of casein. The production of microbial enzymes such as proteinase, lactase, lipase, and microbial rennet with high ratio of milk coagulating property is a technological advancement. The enzymes are nutritionally valuable to overcome malnutrition, obesity and shift toward low-fat and healthy foods.

The addition of probiotic bacteria with metabolically active and viable count can affect quality of product such as organoleptic properties. The viability during storage period and sensory characteristics analysis can be checked.

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**Conflict of Interest:** The authors declare no conflict of interest.

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