



Review Article

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## A Short Review on Cheese Starters Cultures

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### ABSTRACT

*Cheese, general name for dairy products which is produced through chemical changes in casein. Along with casein, a part of whey, fat and other nutrients obtain in clod. The main result of cheese production, keeping milk nutrients in non-spoiling conditions with flavor keeping and no reduction of its nutritional value. Lactic coagulation occurs consequently after lactose fermentation. Regarding this fact of being multifunction of culture Medias, the way they are consuming is different. Compounds producing cheese flavor are manufactured in production process. Starter cultures use in cheese industry are composed of varieties including Lactococcus, Leuconostoc, Lactobacillus Thermophilus and streptococcus thermophilus which have the role of acid production.*

**Key words:** cheese, flavoring compounds, lactic acid bacteria and starter cultures

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### INTRODUCTION

Cheese a so-called product refers to a group of dairy products at which casein, fats and other milk nutritional compounds remains in clot. The real origin of cheese estimates over 7000 years ago (B.C.). The main goal of cheese production is keeping of nutrient compounds in non-spoiling conditions with keeping of desire flavor. In ancient era, simultaneous clotting of milk has been used in cheese making. Lactic coagulation occurs consequently after lactose fermentation. In order to provide high quality, it is necessary that consumed milk has had the best bacteriological and chemical quality (Moatsou et al, 2004).

#### **Cheese starter**

Enzymes with microbial, animal and plant origins can produce a matrix from chaining of casein particles where other milk compounds stabilize in this matrix. Chymosin and Chymase, two important proteolytic digestion enzymes, regarded as the only source of cheese making. The amount of added starter is low that accelerate milk clotting and facilitate syneresis (Georgala et al, 2004).

#### **Different cheese starter**

The most common starter culture, in a wide range of consumption, is starter culture produced from calf's stomach which includes pepsin (Georgala et al, 2004). In recent years, production of starter culture from animal sources faced to some restrictions and its costs increased. In these conditions, tendency to substituting with cheaper sources increased such as inoculation produced from *M. Mihhi* and *M. Pucillus*.

**Moldy cheese rennet**

Most of microorganisms produce enzymes clotting milk; however it seems the best ones are produced by molds. Experiments in Denmark Governmental Research Institute (Report N.O. 228) revealed that using moldy rennet is similar to other rennet. In production of clot, but slight difference observed in acid production in the initial hours of cheese making process.

In comparison with regular cheese rennet no difference observed in in whey (produced from moldy rennet) in measuring of fat lost and dried solid. Additionally more protein decomposition is exhibited in cheese from moldy.

**Starter cultures**

Due to being several dimensions of starter cultures acting, the role of starter microorganisms in production of cheese is important and complex. Their main role is lactose fermentation and its conversion to lactic acid. This action follows by pH reduction both create a fresh peppery taste. Stabilization of casein colloidal suspension weakens due to pH reduction and calcium releases from casein micelles, acceleration of Kymosin and coagulation. Acidic conditions assist removing of moisture and clot contraction (Weimer, 2007).

**The importance of starter cultures in cheese making**

- The continuum production of acid
- Adjustment of optimum pH for enzymatic coagulation activities
- Acid affection on syneresis
- Its affection og cheese aroma
- Preventing of undesired microorganisms growth
- Creation of new properties in cheese like flavor, taste, appearance, texture, CO<sub>2</sub> production

**Different starter cultures****Liquid starter cultures**

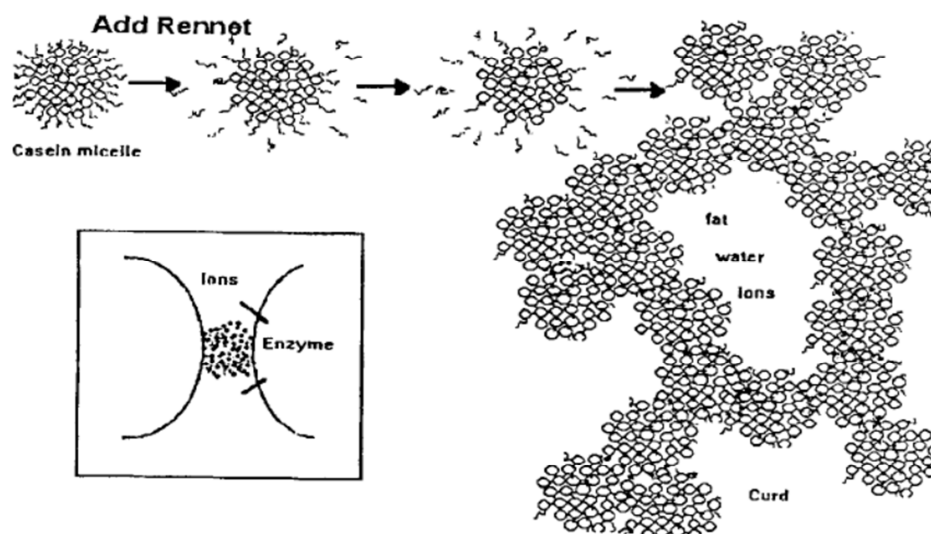
Although liquid starter culture is used in direct inoculation/inoculation of mother culture, but still a remained problem is its contamination in the factories with several times inoculating. As the milk compounds differ from season to season, effecting on the produced starter culture clearly High milk quality provides high quality of starter cultures.

**Freeze dried start culture in liquid nitrogen or dried culture in freezing**

Freeze dried starter culture enjoys easily transporting, 6 month shelf life at 4°C-6°C/ 1 year in keeping at -20°C.

**High concentrated and froze culture for direct inoculation in vat (DVS culture)**

Concentrated Starter cultures in intensified freezing called DVS means direct inoculation in vat. This starter culture is high concentrated have the advantage of direct adding to milk, saving time in providing. DVS is in froze pill form packaged in plastic containers or box type packs with ability of placing at -45°C for 12 months. This starter cultures which are concentrated from pure types of flavor producing bacteria transport in dried ice, preventing the stage of providing mother culture.



**Fig 1. Mechanism of adding rennet**

**Freeze dried starter cultures for daily work**

A part of starter culture can be froze and used for direct inoculation or production of mother culture. To better use of starter culture, it can be inoculate several times in the factory at which an appropriate balance among microorganism takes place. The main problem of this method is cross contamination of starter culture. On the other side, different seasons on mild compounds and bacterial growth in summer/ winter are of paramount issues. This problem can be modified. A method in solving the aforementioned problems is using preserved statute culture at  $-45^{\circ}\text{C}$  due to adaptation of lactic acid bacteria.

**Table 1. Some of the starter cultures used in dairy fermented products (Weimer, 2007)**

Bacteria	The main function	examples
<i>Propionic bacterium shermanii</i>	Production of aroma and hole	Emmental and Swiss cheese
<i>Lactobacillus bulgaricus</i>		
<i>Lactobacillus lactis</i>	Acid and aroma	Kefir, kumis
<i>Lactobacillus helveticus</i>		
<i>Streptococcus thermophilus</i>	Acid production	Cheddar cheese
<i>Streptococcus diacetylactis</i>	Production of acid and aroma	Sour cream, dough
<i>Streptococcus lactis</i>	Acid production	Cheese and sour cream
<i>Streptococcus cremoris</i>		
<i>Leuconostoc citrovorum</i>		
<i>Leuconostoc dextranicum</i>	Aroma production	Sour cream

**Table 2. Different lactic acid bacteria using as starter culture in cheese**

Mesophilic lactic starters	Thermophilic lactic starters
<i>Lactococcus lactis</i> subsp. <i>lactis</i>	<i>Lactobacillus delbrueckii</i> subsp. <i>bulgaricus</i>
<i>Lactococcus lactis</i> biovar <i>diacetylactis</i>	<i>Lactobacillus casei</i> subsp. <i>casei</i>
<i>Lactococcus lactis</i> subsp. <i>cremoris</i>	<i>Lactobacillus acidophilus</i>
<i>Leuconostoc mesenteroides</i> subsp. <i>cremoris</i>	<i>Lactobacillus helveticus</i>
	<i>Streptococcus salivarius</i> subsp. <i>thermophilus</i>

**RESULTS**

1. Cheese as an ever-interesting product contains high nutritional value and consumption so as one of the important foodstuffs regards.
2. With respect to microorganism in production of flavor, there are different types of products can be expected.
3. Regarding the complexity and mostly being unknown of mechanisms, studies must be propelled in the field of their detection.

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