



Physico-chemical characteristics of buttermilk

Introduction

- **Buttermilk: Nutritional by-product of butter making industry**
- **Substantial amount of lassi (sour buttermilk) produced annually as by-products**
- **Total annual production of buttermilk in India estimated at 35 million tonnes**
- **As a by-product it needs proper attention for its judicious utilization**

TYPES OF BUTTERMILK

- **Sweet Cream Buttermilk (SCBM):** By churning of fresh/ pasteurized cream with little or no developed acidity
- **Cultured Buttermilk (chhachh or lassi):** By churning of curd (dahi) during manufacture of makkhan
- **Sour Buttermilk:** By churning naturally sour milk or cream

CHEMICAL COMPOSITION OF BUTTERMILK

- ◆ **Varies depending on water added to cream**
- ◆ **Sour buttermilk differs from sweet cream buttermilk in respect of titratable acidity**
- ◆ **Acidity in sweet cream buttermilk varies from 0.10 to 0.14 %**
- ◆ **Acidity in sour buttermilk > 0.15% and even as high as 1%**

DESI BUTTERMILK

- ▣ **Composition depending on**
 - **Quality of milk used for making curd**
 - **Levels of addition of water during churning**
- ▣ **On average, contains 4% TS → comprising of 0.8% fat, 1.29% protein and 1.2% L.A.**
- ▣ **Brown in colour due to prolonged heating of milk before culturing**
- ▣ **Body not as homogeneous as that of factory produced buttermilk**
- ▣ **When kept undisturbed for sometime → curdy material deposits at bottom**

DIFFERENCE BETWEEN SCBM AND SKIM MILK

◆ Buttermilk contains higher fat

- ▣ The MFGM proteins are hydrophilic and hydrophobic in nature and their physical properties, nitrogen content and amino acid composition do not correspond with any other milk proteins.
 - ▣ These proteins exert emulsion in milk and milk products during manufacture and storage.
 - ▣ SCBM contains about **nine times** higher phospholipids than skim milk
- ## ◆ Phospholipids in buttermilk don't have short chain fatty acids → Principal fatty acids are C16 (palmitic) and higher acids

Average physico-chemical properties of buffalo sweet cream buttermilk and buffalo skim milk

Characteristics	Buttermilk	Skim milk
T.S. (%)	9.88	10.38
Fat (%)	0.59	0.09
Total proteins (%)	3.73	4.27
Lactose (%)	4.81	5.2
Ash (%)	0.75	0.82
Total phospholipids (mg %)	78.56	8.65
Titratable acidity (% LA)	0.12	0.16
pH	6.86	6.69
Curd tension (g)	18.84	66.85
Relative viscosity (cP at 30°C)	1.80	1.64

- ◆ **About 40% by wt. of total phospholipid fatty acids are saturated acids → rest are non-conjugated di- to penta-unsaturated acids**
- ◆ **Phospholipids of buttermilk → more or less equal proportions of lecithin, sphingomyelin and cephalin together with a small proportion of cerebrosides**
- ◆ **Various physico-chemical properties of buttermilk differ from that of skim milk which provides different choices for their selective applications in dairy products manufacture.**

Processing And Drying Of Buttermilk

- ◆ **Composition of SCBM being like that of skim milk → no problems encountered during processing**
- ◆ **Heat stability of SCBM → better than skim milk → more suitable for processing to very high heat treatments**
- ◆ **Concentration and spray drying of SCBM achieved by adopting same standard conditions as those used for skim milk**

- ◆ **High total lipids including phospholipids and low bulk density in SCBM in comparison with skim milk**
- ◆ **Spray dried buttermilk powder → less free flowing and dusty because of high fat content in comparison with skim milk powder**
- ◆ **Though high fat content reduces shelf-life of powder during storage → high phospholipids will provide better oxidative stability to dried buttermilk**

Physico-Chemical Characteristics of Spray Dried Powders

Characteristics	Sweet cream buttermilk powder	Skim milk powder
Moisture (%)	2.59	2.75
Fat (%)	6.38	1.05
Total protein (%)	37.09	40.29
Lactose (%)	47.00	48.15
Ash (%)	6.94	7.76
Total phospholipids (mg %)	625.25	97.1
Titratable acidity (% L.A.)	1.17	1.39
Solubility index (ml)	0.15	0.30
Bulk density (g/ml)	0.345	