

Effect of Calcium Chloride on the Yield & Quality of Paneer

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Abstract - Paneer represents a South Asian variety of soft cheese prepared by acid and heat coagulation of milk. It is a rich source of high quality animal protein, fat, minerals and vitamins. Due to availability of different types of milk and variation in milk composition, various techniques have been developed for the production of paneer as per the requirements of the consumers with appreciable improvement in the yield and other quality characteristics. With growing international trade in Food and Dairy industry for paneer Production, The quantity of product also increases by implementing some methods. So now time to Introduce some additional methods or corrections in old methods.

Keywords: Paneer, Coagulants, Preservatives, Heat treatment, Chemical composition.

I. INTRODUCTION

Paneer is a South Asian variety of soft cheese obtained by acid and heat coagulation of milk. It is a non-fermentative, non-renneted, non-melting and unripened type of cheese. Paneer is popular throughout South Asia, used in raw form or in preparation of several varieties of culinary dishes and snacks. The production of paneer is now spreading throughout the world.

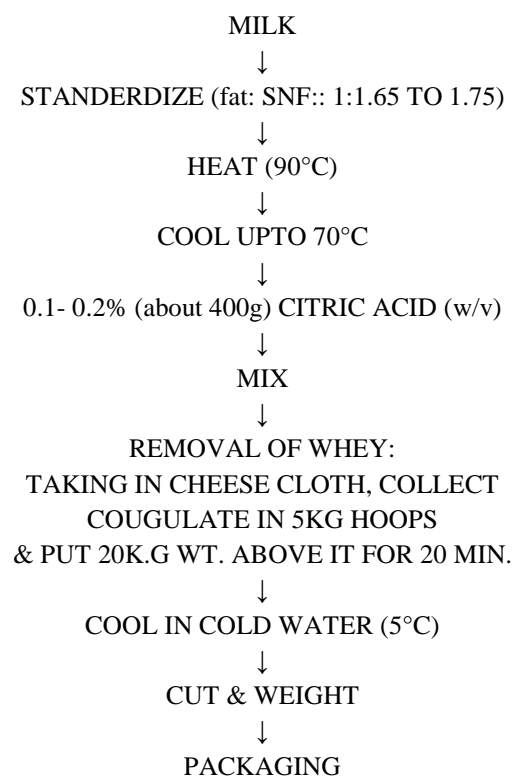
Paneer is a rich source of animal protein available at a comparatively lower cost and forms an important source of animal protein for vegetarians. Over and above its high protein content and digestibility, the biological value of protein in paneer is in the range of 80 to 86 (Shrivastava and Goyal 2007). In addition, paneer is a valuable source of fat, vitamins and minerals like calcium and phosphorus. It has a reasonably long shelf life under refrigeration

Good quality paneer is characterized by a marble white colour, sweetish, mildly acidic taste, nutty flavour, spongy body and closely knit, smooth texture. According to the PFA (2010), paneer means "product obtained from cow or buffalo milk or combination thereof, by precipitation with sour milk, lactic acid, or citric acid. It shall contain not more than 70% moisture and the fat content should not be less than 50% expressed on dry matter". Milk solids may also be used in preparation of paneer. Bureau of Indian Standards (BIS 1983) imposed maximum of 60% moisture and minimum of 50% fat in dry matter for paneer.

The production of paneer has been largely confined to the unorganized dairy sector which employs traditional, inefficient methods of manufacture. Pioneering work for the up gradation of the traditional methods of paneer manufacture was carried out by Bhattacharya et al. (1971). Due to the ever growing demand for paneer, researchers were encouraged to develop new techniques for the manufacture of paneer. Researchers recommended varied processing conditions for the preparation of varieties of paneer using different types of milk

II. METHODS

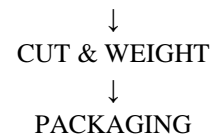
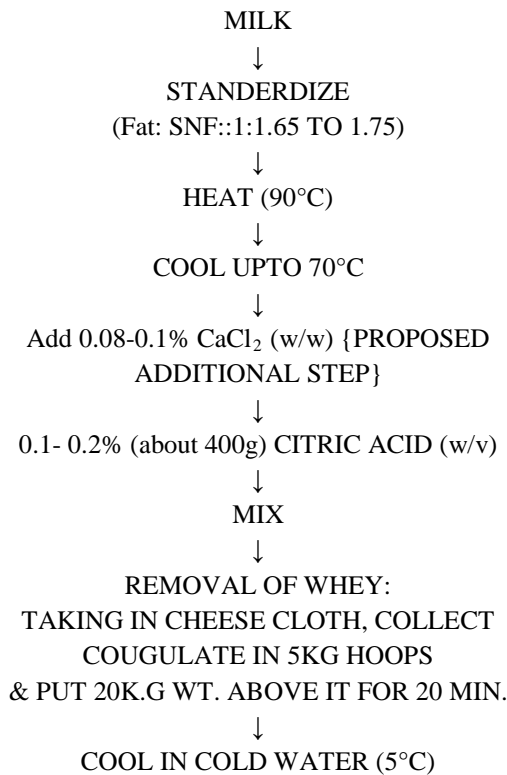
Generally in Lab Scale or Industrial/commercial level the following methods is followed for manufacturing of paneer :



A new manufacturing process is as follows:

In This Study the methods of manufacturing of paneer is modified by the addition of step before addition of citric

acid. (Additional proposed step .i.e: addition of calcium chloride).



III. RESULT & DISCUSSION

Study Design & Data Techniques

This is an exploratory type of statistical analysis in which efficiency of paneer production process is assessed relating to its total solids (TS) of the milk used for making paneer. Analysis of % paneer yield to total weight of milk is done as total solids may vary from day to day but total amount of milk taken per batch is constant.

Since the production quantity being less, somewhere around 135-175kg per day production, therefore, weight of all the batches were taken for continuously 3 days @ 3 batches per day.

Since similar process was used daily for making paneer therefore an average of sample size of 10-15 batches could be taken to represent the population i.e. all year round yield of paneer.

Data Analysis

Day	Batch covered	Fat%	SNF%	Ratio	CLR	Specific gravity (1+CLR/1000)
1	1,2 & 3	5.05	8.34	1:1.652	28.75	1.02875
2	4,5 & 6	5.1	8.47	1:1.661	29.25	1.02925
3	7,8,9 & 10	5.8	10.11	1:1.743	35.25	1.03525

Batch	Quantity in lt. (a)	Specific gravity (b)	Weight of milk in kg (a*b)	Weight of paneer in kg	% yield
1	240	1.02875	246.9	35.381	14.33
2	240	1.02875	246.9	35.186	14.25
3	240	1.02875	246.9	36.085	14.61
4	240	1.02925	274.02	34.922	14.14
5	240	1.02925	274.02	34.813	14.09
6	240	1.02925	274.02	35.203	14.25
7	240	1.03525	248.46	36.892	14.84
8	240	1.03525	248.46	37.099	14.93
9	240	1.03525	248.46	36.917	14.86
10	240	1.03525	248.46	36.989	14.89
Average					14.519

Average % yield of paneer = 14.519%

Standard deviation in % yield of paneer = 0.34%

Since standard deviation is very less i.e. $0.34\% \approx 0.8\text{kg}$, it could be assumed that average % yield of paneer round the year is about $14.52 \pm 0.34\%$.

IV. CONCLUSION

It is clear from the observations that % yield is directly related to the total solids (TS) of the milk. According to Chandan (2007a), the yield of paneer was dependent on the fat and SNF content of the milk used, fat and protein recovered in paneer and its moisture content. A yield of around 21–23% for paneer containing 51–54% moisture can be obtained from buffalo milk, while yield from cow milk is about 17–18%.

REFERENCES

- [1] Chawla et al. (1987) found that addition of 0.1% sodium citrate or 0.5% sodium chloride to milk helped in increasing the moisture content of low fat paneer and thereby yield of the product.
- [2] Singh and Kanawjia (1988) observed that use of 0.1% CaCl_2 to milk prior to coagulation increased total solids recovery, yield and all the sensory characteristics.
- [3] Bhattacharia et al. observe the yield of paneer is dedicated by composition of milk used by given heat treatment & also use the coagulant agent such as calcium chloride.
- [4] Singh and Kanawjia (1991) recommended addition of 0.15% CaCl_2 for paneer to be made from recombined cow milk. A combination of disodium phosphate and calcium chloride has been used in western countries for preparation of low-fat cheese. It increased the softness and elasticity of curd due to the formation of colloidal calcium phosphate (Teknotext 1995).
- [5] Calcium phosphate addition to the milk can help in the coagulation of whey proteins thereby increasing the yield of curd (Dybing and Smith 1998).
- [6] Hill et al. (1982) recommended use of high temperature and CaCl_2 for getting better yield through co-precipitation of casein and whey proteins.
- [7] Kanawjia and Rizvi (2003) recommended use of 0.15% CaCl_2 to micro filtered milk retentate prior to acidification in paneer manufacture. Calcium chloride is sometimes added to processed milk to restore the natural balance between calcium and protein in **casein** for the purposes of making cheeses, such as brie, Pélardon and Stilton.
- [8] Arora et al. (1996) observed that addition of CaCl_2 increased fat, protein, TS, pH and TS recovery and thus yield of paneer made from diluted milk which is most commonly encountered in un-organized sector.
- [9] According to chandan (2007) observe the yield of paneer was dependent on fat & SNF content of milk. the coagulant agent increases the % yield of paneer by coagulation.
- [10] Calcium helps in building the cross linkages during the formation of curd and thus helps in increasing the recovery of milk solids, yield and improves body and texture and overall acceptability scores of paneer. Cow milk paneer has softer body than buffalo milk paneer since cow milk is lower in calcium content. In order to produce good quality cow milk paneer, calcium chloride at the rate of 0.08–0.15% was used to get better quality paneer (Sachdeva et al. 1991; Arya and Bhaik 1992).
- [11] Singh and Kanawjia (1988) observed that use of 0.1% CaCl_2 to milk prior to coagulation increased total solids recovery, yield and all the sensory characteristics. Singh and Kanawjia (1991) recommended addition of 0.15% CaCl_2 for paneer to be made from recombined cow milk. A combination of disodium phosphate and calcium chloride has been used in western countries for preparation of low-fat cheese. It increased the softness and elasticity of curd due to the formation of colloidal calcium phosphate.
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