Effect of different types of milk and various levels of sugar on yield of clotted cream

Anoop Singh Chauhan*, M.P.S. Yadav, Manoj Gupta, Samar Jeet Singh and R.B. Singh

Department of Animal Husbandry and Dairying, C.S.A.U.A.T., Kanpur-208002, India
*e-mail: aschauhan7569@gmail.com

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Abstract: The yield of clotted cream depends on the initial composition of milk, the degree of concentration and the percentage of sugar added. This study was conducted to evaluate the effect of milk and sugar on yield of clotted cream. Here four type of milk (cow milk, buffalo milk, combined milk and skim milk) and three levels of sugar (6%, 8% and 10%) were taken and replicated three times. Overall average yield of Clotted cream was found to be 28.894 per cent. On account of different types of milk, average yield of Clotted cream were recorded to be 29.233, 31.007, 29.969 and 25.367 per cent from cow milk, buffalo milk, combined milk and skim milk, respectively. On account of various levels of sugar, yield of Clotted cream were 27.043, 28.938 and 30.700 per cent at 6%, 8% and 10% sugar level, respectively. The highest yield (32.700%) was noted in the combination of Clotted cream which prepared by buffalo milk with 10% sugar level whereas lowest (23.400%) yield was found in Clotted cream which was prepared by skim milk with 6% sugar level, but 6% sugar was preferred for production of Clotted cream. So it was concluded that the maximum yield can be obtained by increasing fat and total solids in the composition for preparation of Clotted cream. The buffalo milk is suitable for preparation and yield of Clotted cream with 6% sugar level due to higher percentage of total solids.

Key words: Milk, Sugar, Yield and Clotted cream

Introduction

Clotted cream is a primary dairy product which is directly made from milk. This provides the means of preserving precious milk solids. Clotted cream is quite popular in rural as well as urban part of central and eastern regions of India. Clotted cream is an excellent source of milk protein and fat and quick energy giving lactose and sucrose. The % of moisture content ranged between 24.33-38.85%, fat 16.23-22.55%, protein 9.94-12.01%, lactose/sucrose 27.08-43.72%, and ash 2.09-2.84%. Overall mean values were observed at 31.76±0.96%, 19.42±0.33%, 10.74±0.10%, 35.62±0.99% and 2.43±0.03% for moisture, fat, protein, lactose/sucrose and ash, respectively. Energy values of Clotted cream varied between 315.59 and 400.15 Kcal/100 g, with an overall mean of 361.05±4.73 Kcal/100 g. Sensory quality of Clotted cream was within the acceptable range. Scores rated by panel of judges averaged 3.21±0.08 from the score of 5 for appearance, 5.43±0.17 from 10 for aroma, 18.87±0.28 from 30 for taste/flavour, 18.68±0.29 from 30 for body/texture, 5.49±0.15 from 10 for overall sweetness, and 5.29±0.27 from 10 for overall acceptability (Khaskheli, 2008). It has been classed as indigenous partially concentrated and sweetened whole milk product, containing several layers of malai (flakes and cream). Clotted cream prepared by traditional method is unhygienic, non-uniform in quality, has low keeping quality and involves labour and energy intensive method of production. Consequently the cost of this product is usually very high. Clotted cream are produced on tiny scale by traditional practices without much consideration given to quality of milk and final product (Dande, 2011). Optimization of the process parameters of three stages SSHE for continuous Clotted cream production, process was developed to manufacture Clotted cream by integrating Scraped Surface Heat Exchanger (SSHE) with Conical Process Vat (CPV). SSHE is most suitable for handling viscous product with or without particles, products that tend to foul the heat transfer surface (Dodeja, 2006). The manufacture of Clotted cream is still confined to milk confectioners (Halwai) in each locality since no standard method is employed in the manufacture of Clotted cream by the Halwai, great variation in its quality and on a small scale by notice. Since no legal and quality standards exist for Clotted cream, its physical and chemical quality varies widely from place to place and one halwai to another.

The objective of the present study was to find out the maximum yield of Clotted cream with the use particular type of milk and definite quantity of sugar on behalf of its great sensory and neutraceuticals value.

Materials and Methods

The present investigation pertaining to manufacture of clotted cream was carried out in the Department of animal husbandry and dairying, C.S.A.U.A.T., Kanpur. There were four types of milk (cow, buffalo, combined and skim milk) and three levels of sugar (6%, 8% and 10%) used for the preparation of clotted cream. Technological process flows as in annual report NDRI, Karnal as fallowed as suggested by Verma (2005).

Physico-chemical analysis: The sensory (physical) evaluation of Clotted cream was performed by a panel of five expert judges using nine point “Hedonic scale” recommended by Gupta (1976) for food and dairy products for flavour, body & texture, colour and appearance and overall acceptability of Clotted cream. Fat content was determined by modified Gerber centrifuge method described in BIS handbook (1981). The protein content of Clotted cream was determined by Kjeldahl method (Menefee and Overman 1940). Lactose content and sucrose content was determined by the method given by I.C.A.R. (1951). Ash content, total solids and moisture percentage analysed as per methods in BIS (1989).

Statistical analysis: The data on sensory and chemical quality obtaining during the study were subjected for analysis of variance

Table-1: Mean % of yield in regard of milk and sugar

<table>
<thead>
<tr>
<th>Factors</th>
<th>6% Sugar</th>
<th>8% Sugar</th>
<th>10% Sugar</th>
<th>Mean for Milk</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cow milk</td>
<td>27.500</td>
<td>29.300</td>
<td>30.900</td>
<td>29.233</td>
</tr>
<tr>
<td>Buffalo milk</td>
<td>29.167</td>
<td>31.153</td>
<td>32.700</td>
<td>31.007</td>
</tr>
<tr>
<td>Combined milk</td>
<td>28.107</td>
<td>29.800</td>
<td>32.000</td>
<td>29.969</td>
</tr>
<tr>
<td>Skim milk</td>
<td>23.400</td>
<td>25.500</td>
<td>27.200</td>
<td>25.367</td>
</tr>
<tr>
<td>Mean for Sugar</td>
<td>27.043</td>
<td>28.938</td>
<td>30.700</td>
<td>28.894</td>
</tr>
</tbody>
</table>
The yield of Clotted cream was calculated by using following formula:

Yield % = Wt. of Clotted cream (Kg) x 100 / Wt. of milk

Results and Discussion

The data obtained were arranged, tabulated and statistically analysed to find out the significance of differences within treatment interactions and effect of various factors.

Effect of milk on yield of clotted cream: The yield of clotted cream by using cow milk was noticed that 29.233% while highest yield was found from buffalo milk (31.007%) followed by combined milk used (29.233%) and least production of Clotted cream has been noticed with skim milk (25.367%) used. The effect of milk on yield of Clotted cream found to be significantly differed from one to another (p<0.05) Pandey, (2004). In regard of milk, the yield of Clotted cream is depend on total solids content of milk, higher content of solid in milk gives higher yield than lower content of total milk solids.

Effect of sugar on yield of Clotted cream: The % of sugar significantly affected to the production of clotted cream. Higher % of sugar yields maximum yield of clotted cream as 27.043, 28.938 and 30.700% production found with 6, 8 and 10%, respectively. The effect of sugar on yield of Clotted cream differed significantly from one to another (p<0.05) Pandey, (2004). In concern with use of higher percentage of sugar gives higher yield and vice versa.

Interaction effect of milk and sugar on yield of clotted cream: Effect of various type of milk and various levels of sugar on yield of Clotted cream has been non -significantly affected at the level of 5% level of significance. Highest yield of clotted cream has been noticed 32.700% in buffalo milk with 10% sugar while 31.153 and 29.107% yield noticed in same milk with 8 and 6%, respectively. The least production (27.03%) has found in skim milk used with 6% sugar. When cow milk used for preparation of clotted cream the yield obtained as 27.5, 29.3 and 30.9% with 6, 8 and 10% sugar, respectively. Combined milk gives little higher produce yield than cow milk as 28.107, 29.8 and 32.0% with 6, 8 and 10 sugar, respectively. The minimum yield found in skim milk 23.4, 25.5 and 27.2% used with 6, 8 and 10 sugar, respectively (Pandey, 2004). The overall mean yield of clotted cream was 28.894%. The effect of various levels of sugar on yield of Clotted cream was also found to be highly significant (p<0.01), while the effect of interactions of different types of milk and various levels of sugar was found to be non-significant. The total solids percentage depends of constituents which are available in the various levels of sugar was found to be non-significant. The total yield of clotted cream was 28.894%. The effect of various levels of sugar also increases the total solids in the components of clotted cream, but the optimum level of sugar (6%) preferred for the consumption (Pandey, 2004).

The findings of this study imply that the different types of milk and various level of sugar affect the yield of clotted cream. The presence of total solids (fat, protein, lactose and ash) in milk gives higher yield than that milk which is lower in total solids. So buffalo milk is suitable for preparation and yield of clotted cream with 6% sugar level due to higher percentage of total solids.

References


