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## Sensory assessment of cow milk curd samples prepared under incubation temperature of 37 °C using different Fat, SNF combinations

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### Abstract

Curd is extensively consumed in India is a traditional fermented milk product. The study was undertaken to find the best combination of Fat and Solids Not Fat for the preparation of curd. The effect of incubation temperature of 37 °C on the quality of curd samples under different combination of Fat and Solids Not Fat was investigated. Sensory attributes of curd samples mainly colour and appearance, body and texture, flavour, and overall acceptability were evaluated on a nine-point hedonic scale. In Statistical analysis significant ( $P < 0.05$ ) increase in the score was also observed in body and texture, and colour and appearance score of curd samples prepared from 3.5% fat and 10% Solids Not Fat at incubation temperature 37 °C. Flavour and Texture, Colour and Appearance, Body and Texture, Overall acceptability scores of curd samples prepared at incubation temperature 37 °C with 3.5% fat and 10% Solids Not combination was  $8.67 \pm 0.21$ ,  $8.67 \pm 0.21$ ,  $8.67 \pm 0.21$ ,  $8.67 \pm 0.09$  respectively.

**Keywords:** Cow milk curd, sensory evaluation, 9 point hedonic scale ratings, incubation temperature 37 °C

### Introduction

Curd is a traditional fermented milk product used as an item of daily diet in most parts of India. Its preparation on small scale is common household practice, and consists of inoculating boiled cow or buffalo milk with 0.5 to 1.0 percent of lactic culture, usually the previous day's Curd and holding overnight at ambient temperature. Converting milk into Curd is one way of extending the shelf-life of milk under tropical conditions, whereby the milk solids are conserved in a palatable form Tamime and Davies (1987) [16]. In its various forms as Lassi, Shrinkhand, Misti curd etc. Curd contributes significantly to the nutritive content of an average Indian diet. (Garg. 1988) [4].

A study is needed to explore the ways and means of producing best quality curd without much acid development. In this present research cow milk curd samples prepared under incubation temperature of 37 °C using different Fat, SNF combinations were evaluated and Sensory evaluation of curd samples were made to judge the good quality product.

### Material and Methods

Different cow milk curd samples are prepared by altering fat and SNF combinations at incubation temperature 37 °C as shown in the following table: -

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Species	Trial	Fat %	SNF %
Cow milk	C1	3.2	8.3
	C2	3.5	8.5
			9.0
			10.0
			11.0
	C3	4	12.0
			8.5
			9.0
			10.0
	C4	4.5	11.0
			12.0
			8.5
			9.0
	C5	5	10.0
11.0			
12.0			
8.5			
C6	5.5	9.0	
		10.0	
		11.0	
		12.0	
C7	6	8.5	
		9.0	
		10.0	
		11.0	
			12.0

**Results and Discussion**

An examination of data in table-1.0 shows that the curd prepared from milk containing 3.5% fat and 10% SNF scored significantly ( $P < 0.05$ ) higher with higher sensory scores than the samples prepared from 11 and 12 % SNF. In the same way, significant ( $P < 0.05$ ) increase in the score was also observed in body and texture, and colour and appearance score of curd samples prepared from 3.5% fat and 10% SNF. This combination was selected as best quality curd without acid development. (Brauss *et al.*, 1999) <sup>[1]</sup> and Chawala, *et al.*, 1994) <sup>[2]</sup>. All the increased scores on the physical attributes of curd have shown statistically high ( $P < 0.05$ ) differences.

The result findings were in accordance with *Tamine and Robinson* (1988). They stated that basic mix of yoghurt is concentrated to around 14 -15 percent total solids. The level of solids also affects the titrable acidity of the mix. The mean  $\pm$  S.E. value of all trials are given in the table – 1 and graphically represented in Fig. 1,2,3,4. Statistical analysis were based on one way analysis. (Hong and Goh, 1979) <sup>[7]</sup>.

Sensory assessment of cow milk curd samples prepared under incubation temperature of 37 °C using different Fat, SNF combinations revealed that flavour improvement in cow milk is due to higher concentration of citric acid which is directly responsible for flavour in milk and its products. (Dutta *et al.*, 1972) <sup>[3]</sup>. The rest of the characteristics are mostly depending on the liking of the experts. (Nelson and Trout 1964) <sup>[11]</sup>. The results of present study confirmed the findings of Iyengar, *et al.* (1967) <sup>[9]</sup> who concluded that the flavour score of yoghurt was constantly better when prepared from cow milk. (Hassan and Mistry, 1991) <sup>[6]</sup>.

The colour and appearance score of curd enhanced as the volume of fat increases in milk, irrespective of starter culture used. (Sleten and Yuceer (2006) <sup>[15]</sup>. Furthermore, increasing the starter culture did not affect the colour and appearance of curd prepared at all the levels of fat. Salem *et al.* (1994). <sup>[13]</sup>. Shaker *et al* (1994) <sup>[14]</sup>.

**Sensory analysis of curd**

Sensory attributes of curd samples mainly colour and appearance, body and texture, flavor, and overall acceptability were evaluated on a nine-point hedonic scale (9 for liking extremely and 1 for disliking extremely) by a panel of six discriminative and communicative judges. (Hussain *et al.* 2016) <sup>[8]</sup>.

**Table 1:** Sensory Score of cow curd milk samples prepared under incubation temperature of 37 °C with different Fat and SNF combinations

9 Point Hedonic Scale –Sensory evaluation score				
Treatment under different Fat and SNF Combinations	Flavour and taste	Body and Texture	Colour and Appearance	Overall Acceptability
C1A11	7.5 $\pm$ 0.22 <sup>aefgh</sup>	7.17 $\pm$ 0.17 <sup>abcdef</sup>	7.67 $\pm$ 0.21 <sup>cde</sup>	7.44 $\pm$ 0.07 <sup>fg hij</sup>
C2A11	6.5 $\pm$ 0.22 <sup>abc</sup>	7.67 $\pm$ 0.21 <sup>efg</sup>	7 $\pm$ 0.26 <sup>abc</sup>	7.06 $\pm$ 0.1 <sup> abcdefg</sup>
C2A21	7 $\pm$ 0.26 <sup>bcdef</sup>	7.5 $\pm$ 0.22 <sup>defg</sup>	7.5 $\pm$ 0.22 <sup>cde</sup>	7.33 $\pm$ 0.12 <sup>defghij</sup>
C2A31	8.67 $\pm$ 0.21 <sup>i</sup>	8.67 $\pm$ 0.21 <sup>h</sup>	8.67 $\pm$ 0.21 <sup>f</sup>	8.67 $\pm$ 0.09 <sup>l</sup>
C2A41	8 $\pm$ 0.26 <sup>h</sup>	7.67 $\pm$ 0.21 <sup>efg</sup>	8 $\pm$ 0.26 <sup>def</sup>	7.89 $\pm$ 0.14 <sup>k</sup>
C2A51	7.67 $\pm$ 0.21 <sup>fgh</sup>	7.67 $\pm$ 0.21 <sup>efg</sup>	7.67 $\pm$ 0.33 <sup>cde</sup>	7.67 $\pm$ 0.19 <sup>jk</sup>
C3A11	6.5 $\pm$ 0.22 <sup>abc</sup>	7.33 $\pm$ 0.21 <sup>cdefg</sup>	8 $\pm$ 0.26 <sup>def</sup>	7.28 $\pm$ 0.18 <sup> cdefghij</sup>
C3A21	7.5 $\pm$ 0.22 <sup>efgh</sup>	7.5 $\pm$ 0.22 <sup>defg</sup>	8 $\pm$ 0.26 <sup>def</sup>	7.67 $\pm$ 0.17 <sup>jk</sup>
C3A31	6.83 $\pm$ 0.17 <sup>abcde</sup>	7.83 $\pm$ 0.17 <sup>fg</sup>	7.5 $\pm$ 0.22 <sup>cde</sup>	7.39 $\pm$ 0.1 <sup>efghij</sup>
C3A41	6.5 $\pm$ 0.22 <sup>abc</sup>	7.67 $\pm$ 0.21 <sup>efg</sup>	8 $\pm$ 0.26 <sup>def</sup>	7.39 $\pm$ 0.1 <sup>defghij</sup>
C3A51	7.5 $\pm$ 0.22 <sup>efgh</sup>	7.83 $\pm$ 0.17 <sup>fg</sup>	7.67 $\pm$ 0.21 <sup>cde</sup>	7.67 $\pm$ 0.09 <sup>jk</sup>
C4A11	7.17 $\pm$ 0.17 <sup>cdefg</sup>	8 $\pm$ 0 <sup>g</sup>	7.67 $\pm$ 0.21 <sup>cde</sup>	7.61 $\pm$ 0.1 <sup>ijk</sup>
C4A21	7.83 $\pm$ 0.17 <sup>gh</sup>	7.5 $\pm$ 0.22 <sup>defg</sup>	7.17 $\pm$ 0.17 <sup>abcd</sup>	7.5 $\pm$ 0.07 <sup>ghijk</sup>
C4A31	7 $\pm$ 0.26 <sup>bcdef</sup>	7.5 $\pm$ 0.34 <sup>defg</sup>	8 $\pm$ 0.26 <sup>def</sup>	7.5 $\pm$ 0.14 <sup>ghijk</sup>
C4A41	7.5 $\pm$ 0.22	7.83 $\pm$ 0.31 <sup>fg</sup>	7.33 $\pm$ 0.21 <sup>bcd</sup>	7.56 $\pm$ 0.07 <sup>hijk</sup>
C4A51	7.17 $\pm$ 0.31 <sup>cdefg</sup>	7.17 $\pm$ 0.17 <sup>bcdef</sup>	6.67 $\pm$ 0.21 <sup>ab</sup>	7 $\pm$ 0.12 <sup>abcdef</sup>
C5A11	7 $\pm$ 0.26 <sup>bcdef</sup>	7.33 $\pm$ 0.21 <sup>cdefg</sup>	6.5 $\pm$ 0.22 <sup>a</sup>	6.94 $\pm$ 0.13 <sup>abcde</sup>
C5A21	7.5 $\pm$ 0.22 <sup>efgh</sup>	7.17 $\pm$ 0.31 <sup>bcdef</sup>	7.5 $\pm$ 0.22 <sup>cde</sup>	7.39 $\pm$ 0.16 <sup> defghij</sup>
C5A31	7.33 $\pm$ 0.21 <sup>defgh</sup>	7.5 $\pm$ 0.22 <sup>defg</sup>	6.67 $\pm$ 0.33 <sup>ab</sup>	7.17 $\pm$ 0.19 <sup>bcdefghi</sup>
C5A41	7 $\pm$ 0 <sup>bcdef</sup>	6.5 $\pm$ 0.22 <sup>ab</sup>	7.5 $\pm$ 0.22 <sup>cde</sup>	7 $\pm$ 0.12 <sup>abcdef</sup>
C5A51	6.5 $\pm$ 0.22 <sup>abc</sup>	7.33 $\pm$ 0.21 <sup>cdefg</sup>	6.67 $\pm$ 0.33 <sup>ab</sup>	6.83 $\pm$ 0.14 <sup>abc</sup>
C6A11	7 $\pm$ 0.26 <sup>bcdef</sup>	6.67 $\pm$ 0.33 <sup>abc</sup>	7.33 $\pm$ 0.21 <sup>bcd</sup>	7 $\pm$ 0.09 <sup>abcdef</sup>
C6A21	6.83 $\pm$ 0.31 <sup>abcde</sup>	6.5 $\pm$ 0.22 <sup>ab</sup>	7.5 $\pm$ 0.22 <sup>cde</sup>	6.94 $\pm$ 0.13 <sup>abcde</sup>
C6A31	6.83 $\pm$ 0.17 <sup>abcde</sup>	6.33 $\pm$ 0.21	8.17 $\pm$ 0.17 <sup>ef</sup>	7.11 $\pm$ 0.14 <sup> abcdefgh</sup>
C6A41	6.67 $\pm$ 0.21 <sup>abcd</sup>	7 $\pm$ 0.26 <sup>abcde</sup>	8 $\pm$ 0.26 <sup>def</sup>	7.22 $\pm$ 0.11 <sup> cdefghij</sup>

C6A51	6.33 ± 0.21 <sup>ab</sup>	6.67 ± 0.33 <sup>abc</sup>	7.5 ± 0.22 <sup>cde</sup>	6.83 ± 0.21 <sup>abc</sup>
C7A11	6.83 ± 0.17 <sup>abcde</sup>	6.83 ± 0.31 <sup>abcd</sup>	7.5 ± 0.22 <sup>cde</sup>	7.06 ± 0.18 <sup>abcdefg</sup>
C7A21	6.33 ± 0.21 <sup>ab</sup>	7.33 ± 0.21 <sup>cdefg</sup>	6.5 ± 0.22 <sup>a</sup>	6.72 ± 0.16 <sup>ab</sup>
C7A31	6.5 ± 0.22 <sup>abc</sup>	7 ± 0.26 <sup>abcde</sup>	7.17 ± 0.17 <sup>abcd</sup>	6.89 ± 0.07 <sup>abcd</sup>
C7A41	6.67 ± 0.21 <sup>abcd</sup>	7.83 ± 0.17 <sup>fg</sup>	7.5 ± 0.22 <sup>cde</sup>	7.33 ± 0.09 <sup>defghij</sup>
C7A51	6.17 ± 0.17 <sup>a</sup>	7.17 ± 0.17 <sup>bcdef</sup>	6.67 ± 0.33 <sup>ab</sup>	6.67 ± 0.12 <sup>a</sup>
F Value	6.505***	4.751***	4.959***	9.447***

\* Mean ± Standard error values from six trials. Mean values bearing different superscripts in a column differs

\*\*\* significant (P ≤ 0.05)

C1A11	-	Cow milk curd made with 3.2% fat and 8.3% SNF under incubation temperature 37 °C
C2A11	-	Cow milk curd made with 3.5% fat and 8.5% SNF under incubation temperature 37 °C
C2A21	-	Cow milk curd made with 3.5% fat and 9 % SNF under incubation temperature 37 °C
C2A31	-	Cow milk curd made with 3.5% fat and 10 % SNF under incubation temperature 37 °C
C2A41	-	Cow milk curd made with 3.5% fat and 11 % SNF under incubation temperature 37 °C
C2A51	-	Cow milk curd made with 3.5% fat and 12 % SNF under incubation temperature 37 °C
C3A11	-	Cow milk curd made with 4 % fat and 8.5% SNF under incubation temperature 37 °C
C3A21	-	Cow milk curd made with 4 % fat and 9 % SNF under incubation temperature 37 °C
C3A31	-	Cow milk curd made with 4 % fat and 10 % SNF under incubation temperature 37 °C
C3A41	-	Cow milk curd made with 4 % fat and 11 % SNF under incubation temperature 37 °C
C3A51	-	Cow milk curd made with 4 % fat and 12 % SNF under incubation temperature 37 °C
C4A11	-	Cow milk curd made with 4.5 % fat and 8.5% SNF under incubation temperature 37 °C
C4A21	-	Cow milk curd made with 4.5 % fat and 9 % SNF under incubation temperature 37 °C
C4A31	-	Cow milk curd made with 4.5 % fat and 10 % SNF under incubation temperature 37 °C
C4A41	-	Cow milk curd made with 4.5 % fat and 11 % SNF under incubation temperature 37 °C
C4A51	-	Cow milk curd made with 4.5 % fat and 12 % SNF under incubation temperature 37 °C
C5A11	-	Cow milk curd made with 5 % fat and 8.5% SNF under incubation temperature 37 °C
C5A21	-	Cow milk curd made with 5 % fat and 9 % SNF under incubation temperature 37 °C
C5A31	-	Cow milk curd made with 5 % fat and 10 % SNF under incubation temperature 37 °C
C5A41	-	Cow milk curd made with 5 % fat and 11 % SNF under incubation temperature 37 °C
C5A51	-	Cow milk curd made with 5 % fat and 12 % SNF under incubation temperature 37 °C
C6A11	-	Cow milk curd made with 5.5 % fat and 8.5% SNF under incubation temperature 37 °C
C6A21	-	Cow milk curd made with 5.5% fat and 9 % SNF under incubation temperature 37 °C
C6A31	-	Cow milk curd made with 5.5% fat and 10 % SNF under incubation temperature 37 °C
C6A41	-	Cow milk curd made with 5.5% fat and 11 % SNF under incubation temperature 37 °C
C6A51	-	Cow milk curd made with 5.5% fat and 12 % SNF under incubation temperature 37 °C
C7A11	-	Cow milk curd made with 6 % fat and 8.5% SNF under incubation temperature 37 °C
C7A21	-	Cow milk curd made with 6 % fat and 9 % SNF under incubation temperature 37 °C
C7A31	-	Cow milk curd made with 6 % fat and 10 % SNF under incubation temperature 37 °C
C7A41	-	Cow milk curd made with 6 % fat and 11 % SNF under incubation temperature 37 °C
C7A51	-	Cow milk curd made with 6 % fat and 12 % SNF under incubation temperature 37 °C

\* Mean ± Standard error values from six trials. Mean values bearing different superscripts in a column differs

\*\*\* Significant (P ≤ 0.05)

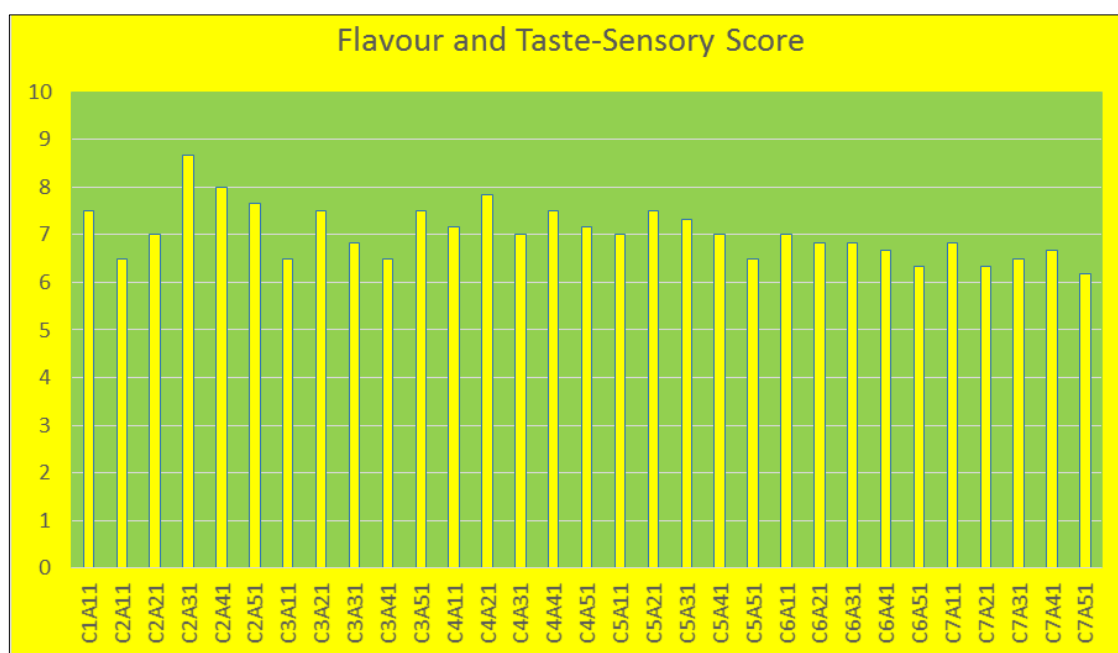
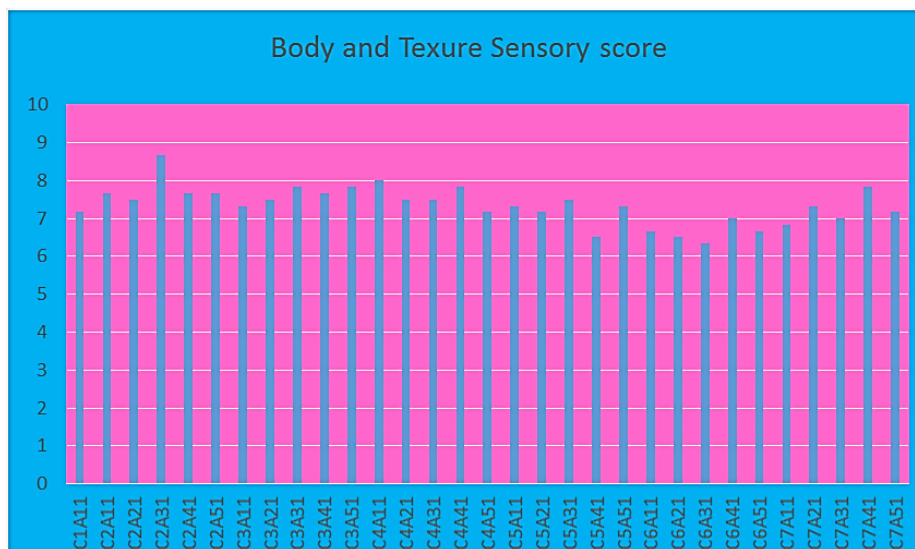
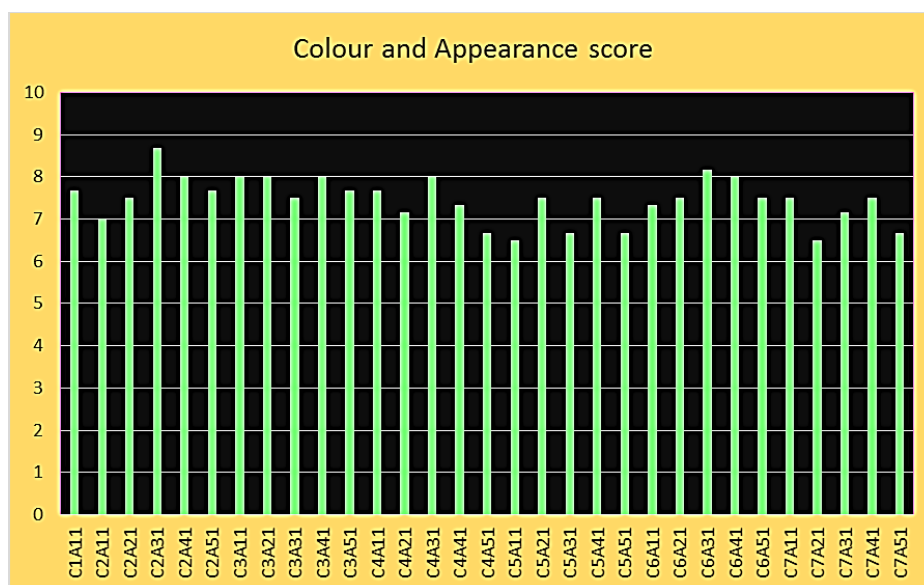


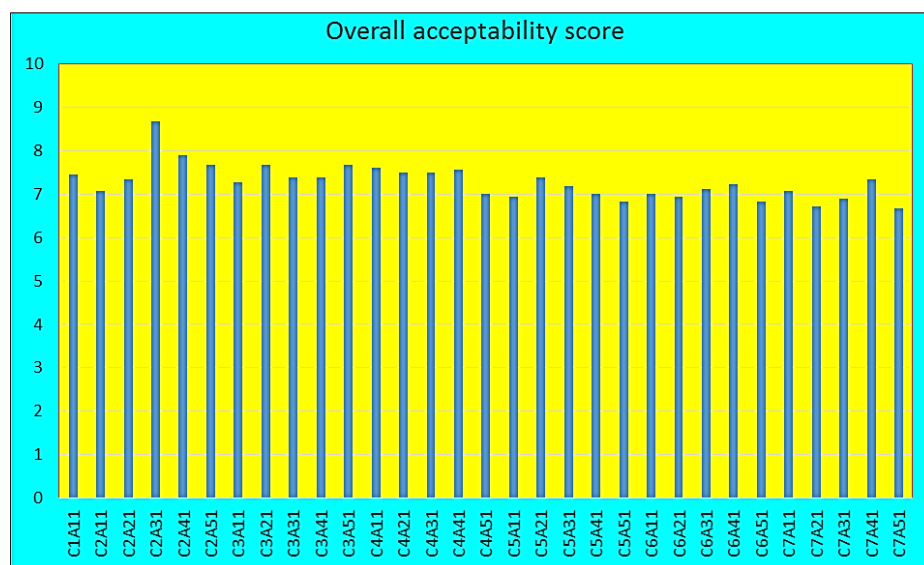
Fig 1: Flavour and Taste Sensory score cow of curd milk samples prepared under incubation temperature of 37 °C with different Fat and SNF combinations



**Fig 2:** Body and Texture Sensory score of cow curd milk samples prepared under incubation temperature of 37 °C with different Fat and SNF combinations



**Fig 3:** Colour and Appearance Sensory score of cow curd milk samples prepared under incubation temperature of 37 °C with different Fat and SNF combinations



**Fig 4:** Overall acceptability score of cow curd milk samples prepared under incubation temperature of 37 °C with different Fat and SNF combinations

## Conclusion

Based on the sensory score, body and texture, and colour and appearance score, Overall acceptability scores of various fat and Solids Not Fat combinations of cow curd samples prepared at incubation temperature 37 °C, it was concluded that cow curd sample with 3.5% fat and 10% Solids Not Fat prepared under incubation temperature 37 °C was rated as the best by the sensory panel.

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