

Influence of processing and packaging conditions on probiotic survivability rate, physico-chemical and sensory characteristics of low calorie synbiotic milk beverage

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SUPPLEMENTARY FILE

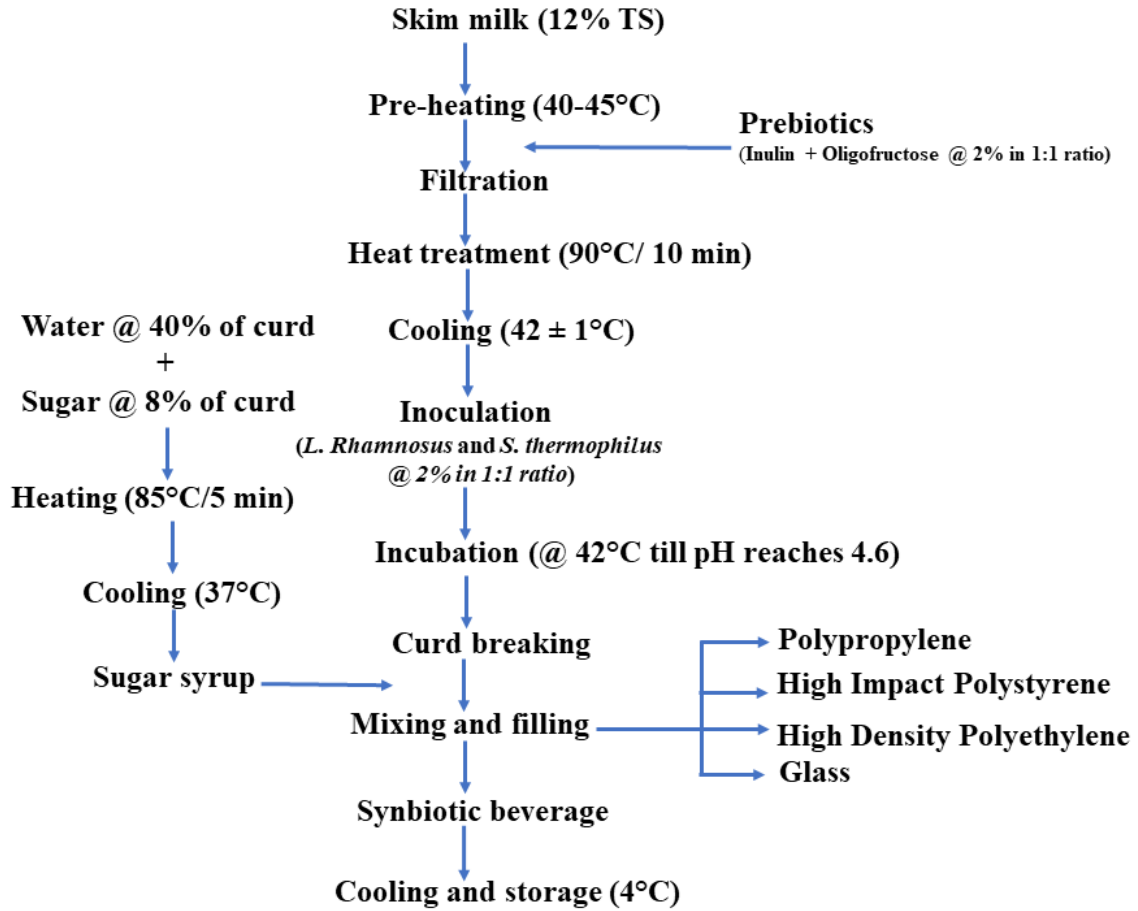


Fig S1: Flow diagram for the preparation of low calorie synbiotic milk beverage

Table S1: Various specification of packaging materials used in the study

S.No	Packaging material	Specifications
1	Polypropylene (PP)	Microbial quality: Sterile Capacity:100mL Dimensions (lengthXwidth): 7cmX4.6cm
2	Glass	Microbial quality: Sterile Capacity: 100mL Dimensions(lengthXwidth)::10cmX5cm . The oxygen and water vapor barrier properties of glass were considered negligible
3	High Impact polystyrene (HIPS)	Microbial quality: Sterile Capacity: 100mL Dimensions (lengthXwidth)::7cmX4.6cm
4	High Density polyethylene (HDPE)	Microbial quality: Sterile Capacity: 100mL Dimensions (lengthXwidth)::7cmX4.6cm

Table S2: Effect of different levels of sugar and water on physico-chemical attributes of low calorie synbiotic milk beverage

Level of water (%)	Level of Sugar (%)		
	6	7	8
pH			
30	4.60±0.07 ^{bB}	4.67±0.06 ^{aB}	4.69±0.01 ^{aB}
35	4.70±0.05 ^{aB}	4.72±0.05 ^{aB}	4.75±0.06 ^{aB}
40	4.80±0.04 ^{aA}	4.83±0.04 ^{aA}	4.86±0.05 ^{aA}
Acidity (% lactic acid)			
30	0.83±0.02 ^{aA}	0.82±0.01 ^{aA}	0.80±0.02 ^{aA}
35	0.79±0.02 ^{aB}	0.78±0.03 ^{aAB}	0.76±0.03 ^{aB}
40	0.75±0.01 ^{aC}	0.76±0.05 ^{aC}	0.74±0.04 ^{aBC}
Probiotic count (log cfu/mL)			
30	9.02 ±0.02 ^{aA}	9.01±0.01 ^{aA}	9.00±0.01 ^{aA}
35	8.97±0.05 ^{aB}	8.96±0.03 ^{aB}	8.95±0.06 ^{aB}
40	8.94±0.04 ^{aB}	8.95±0.05 ^{aB}	8.96±0.04 ^{aB}
Apparent viscosity (Pa.s)			
30	2.25 ±0.002 ^{aA}	2.23±0.001 ^{bA}	2.20±0.001 ^{cA}
35	2.15±0.006 ^{aB}	2.14±0.004 ^{aB}	2.13±0.002 ^{aB}
40	2.00±0.002 ^{aC}	1.98±0.007 ^{abC}	1.96±0.006 ^{cC}
<i>L</i> *			
30	73.93 ±0.55 ^{aA}	72.45±0.78 ^{aA}	70.45 ±0.34 ^{bA}
35	70.12±0.42 ^{aB}	69.14±0.59 ^{aB}	68.47 ±0.24 ^{aB}
40	60.45±0.36 ^{aC}	59.47 ±0.69 ^{aC}	56.74 ±0.24 ^{bC}
<i>a</i> *			
30	2.87 ±0.15 ^{aA}	2.86±0.24 ^{bA}	2.84±0.65 ^{bA}
35	2.31 ±0.23 ^{aAB}	2.34±0.27 ^{aB}	2.36±0.42 ^{aA}
40	2.20±0.35 ^{bB}	2.25±0.39 ^{aB}	2.12±0.36 ^{bB}
<i>b</i> *			
30	20.60±0.30 ^{aBC}	21.30±0.47 ^{aB}	22.40±0.37 ^{aC}
35	21.45 ±0.89 ^{aB}	22.36±0.35 ^{aB}	24.36 ±0.69 ^{aB}
40	25.12±0.24 ^{bA}	25.63±0.34 ^{aA}	27.15 ±0.38 ^{bA}

All the values are Mean ± S.D (n=9)

^{abcd}Mean values in a row with at least one similar superscript do not differ significantly (P>0.05)

^{ABCD}Mean values in a column with at least one similar superscript do not differ significantly (P>0.05)

Table S3: Effect of different levels of sugar and water on sensory attributes of low-calorie synbiotic milk beverage

<i>Level of water (%)</i>	<i>Level of Sugar (%)</i>		
	6	7	8
Appearance			
30	7.7 ± 0.14 ^{bA}	7.6 ± 0.06 ^{bC}	7.9 ± 0.05 ^{aB}
35	7.8 ± 0.08 ^{bA}	7.7 ± 0.09 ^{bB}	8.0 ± 0.08 ^{aB}
40	8.0 ± 0.10 ^{cA}	8.2 ± 0.06 ^{bA}	8.4 ± 0.14 ^{aA}
Flavour			
30	7.2 ± 0.14 ^{aB}	7.4 ± 0.09 ^{aC}	7.5 ± 0.06 ^{aC}
35	7.5 ± 0.10 ^{bB}	7.7 ± 0.11 ^{aB}	7.8 ± 0.08 ^{aB}
40	7.9 ± 0.10 ^{bA}	8.0 ± 0.07 ^{bA}	8.2 ± 0.08 ^{aA}
Body & Texture			
30	7.1 ± 0.08 ^{bC}	7.5 ± 0.06 ^{aB}	7.6 ± 0.11 ^{aC}
35	7.5 ± 0.05 ^{bB}	7.6 ± 0.08 ^{bB}	7.8 ± 0.09 ^{aB}
40	7.9 ± 0.07 ^{aA}	8.0 ± 0.07 ^{aA}	8.1 ± 0.07 ^{aA}
Sourness			
30	1.2 ± 0.05 ^{aA}	0.9 ± 0.06 ^{bB}	0.8 ± 0.06 ^{bA}
35	1.0 ± 0.02 ^{aB}	0.8 ± 0.08 ^{bB}	0.7 ± 0.05 ^{bA}
40	1.0 ± 0.06 ^{aB}	1.1 ± 0.06 ^{aA}	0.7 ± 0.09 ^{bA}
Overall acceptability			
30	7.3 ± 0.05 ^{cC}	7.5 ± 0.11 ^{bC}	7.7 ± 0.08 ^{aC}
35	7.6 ± 0.08 ^{bB}	7.7 ± 0.02 ^{bB}	7.9 ± 0.10 ^{aB}
40	8.0 ± 0.09 ^{bA}	8.1 ± 0.02 ^{bA}	8.2 ± 0.10 ^{aA}

All the values are Mean ± S.D (n=21)

^{abcd}Mean values in a row with at least one similar superscript do not differ significantly (P>0.05)

^{ABCD}Mean values in a column with at least one similar superscript do not differ significantly (P>0.05)

Table S4: Physico-chemical, microbial and colour value of low calorie synbiotic milk beverage

S.No	Parameters	Value	
1.	Total solids (%)	14.66±0.53	
2.	Protein (%)	2.24±0.13	
3.	Fat (%)	0.07±0.10	
4.	Lactose (%)	3.76±0.13	
5.	Ash (%)	0.58±0.16	
6.	pH	4.81±0.09	
7.	Acidity (% lactic acid)	0.69±0.06	
8.	Probiotic count (log cfu/mL)	8.91±0.01	
9.	Viscosity (Pa.s)	1.99±0.003	
10.	Colour value	L*	55.89 ±0.17
		a*	2.34±0.28
		b*	26.65 ±0.31
11.	Total viable count (log cfu/mL)	9.05±0.18	
12.	Coliform count (log cfu/mL)	NIL	
13.	Yeast and Mold count (log cfu/mL)	NIL	

All the values are Mean ± S.D (n=9)

Table S5: Effect of packaging materials on sensory attributes of low calorie synbiotic milk beverage during storage (4±1 °C)

Days	Polypropylene	HIPS	HDPE	Glass
Appearance				
0	7.52±0.12 ^{aA}	7.53±0.36 ^{aA}	7.56±0.21 ^{aA}	7.58±0.24 ^{aA}
1	7.15±0.36 ^{aA}	7.31±0.24 ^{aA}	7.26±0.62 ^{aA}	7.32±0.37 ^{aA}
3	7.07±0.24 ^{aAB}	6.95±0.27 ^{aB}	6.91±0.37 ^{aAB}	7.12±0.35 ^{aAB}
6	6.55±0.14 ^{aC}	6.46±0.20 ^{aC}	6.57±0.31 ^{aB}	6.85±0.27 ^{aB}
9	5.98±0.18 ^{bD}	6.27±0.36 ^{aC}	5.73±0.27 ^{cC}	6.50±0.24 ^{aC}
12	Spoiled	5.72±0.18 ^{bD}	Spoiled	6.03±0.36 ^{aD}
15	Spoiled	Spoiled	Spoiled	5.86±0.79 ^{CD}
Flavor				
0	8.07±0.17 ^{aA}	8.06±0.35 ^{aA}	8.08±0.46 ^{aA}	8.02±0.27 ^{aA}
1	7.88±0.25 ^{aA}	7.58±0.27 ^{aB}	7.77±0.13 ^{aAB}	7.76±0.35 ^{aB}
3	7.53±0.36 ^{aAB}	7.12±0.38 ^{bC}	7.13±0.35 ^{bB}	7.23±0.24 ^{aC}
6	7.08±0.37 ^{aB}	6.68±0.34 ^{abD}	6.55±0.27 ^{bC}	7.08±0.26 ^{aC}
9	6.58±0.48 ^{aC}	6.08±0.24 ^{bE}	5.52±0.34 ^{cD}	6.53±0.78 ^{aC}
12	Spoiled	5.82±0.26 ^{aF}	Spoiled	6.08±0.24 ^{aD}
15	Spoiled	Spoiled	Spoiled	5.79±0.20 ^{aE}
Body & Texture				
0	7.66±0.30 ^{aA}	7.69±0.34 ^{aA}	7.69±0.27 ^{aA}	7.61±0.24 ^{aA}
1	7.37±0.24 ^{aA}	7.44±0.36 ^{aA}	7.36±0.24 ^{aA}	7.20±0.34 ^{aB}
3	6.92±0.38 ^{aB}	7.07±0.17 ^{aB}	6.93±0.36 ^{aB}	6.82±0.27 ^{bB}
6	6.58±0.74 ^{aAB}	6.43±0.27 ^{aC}	6.57±0.34 ^{aB}	6.66±0.59 ^{aC}
9	6.03±0.37 ^{bC}	6.02±0.26 ^{bD}	6.12±0.27 ^{bC}	6.38±0.16 ^{aD}
12	Spoiled	5.32±0.35 ^{abE}	Spoiled	5.57±0.14 ^{aE}
15	Spoiled	Spoiled	Spoiled	4.93±0.35 ^F
Sourness				
0	4.07±0.24 ^{aD}	4.08±0.49 ^{aE}	4.09±0.14 ^{aE}	4.03±0.30 ^{aE}
1	4.23±0.27 ^{aD}	4.29±0.56 ^{aE}	4.33±0.26 ^{aD}	4.26±0.41 ^{aDE}
3	5.58±0.36 ^{aC}	4.99±0.30 ^{bD}	5.49±0.23 ^{aC}	4.82±0.33 ^{bD}
6	6.02±0.48 ^{aB}	5.62±0.15 ^{bC}	6.12±0.48 ^{aB}	5.59±0.36 ^{bC}
9	6.99±0.27 ^{aA}	6.09±0.13 ^{bB}	6.95±0.42 ^{aA}	6.12±0.75 ^{bB}
12	Spoiled	6.64±0.10 ^{aA}	Spoiled	6.30±0.23 ^{bB}
15	Spoiled	Spoiled	Spoiled	6.82±0.20 ^A
Overall Acceptability				
0	7.57±0.24 ^{aA}	7.69±0.14 ^{aA}	7.68±0.24 ^{aA}	7.69±0.45 ^{aA}
1	7.33±0.36 ^{aA}	7.25±0.26 ^{aB}	7.44±0.35 ^{aA}	7.44±0.35 ^{aA}
3	7.08±0.75 ^{aB}	7.13±0.34 ^{aB}	7.13±0.37 ^{aAB}	7.12±0.27 ^{aAB}
6	6.73±0.22 ^{aBC}	6.83±0.47 ^{aB}	6.89±0.24 ^{aB}	6.99±0.31 ^{aB}
9	5.82±0.36 ^{bD}	6.62±0.31 ^{aBC}	5.72±0.31 ^{bC}	6.72±0.36 ^{aB}
12	Spoiled	6.08±0.32 ^{bD}	Spoiled	6.39±0.24 ^{aC}
15	Spoiled	Spoiled	Spoiled	5.62±0.38 ^D

All the values are Mean ± S.D (n=21)

^{abcd}Mean values in a row with at least one similar superscript do not differ significantly ($P>0.05$)
^{ABCD}Mean values in a column with at least one similar superscript do not differ significantly ($P>0.05$)