APPENDIX - A

Milk Based Dessert Score Card

Name of the judge: 
Replication No: 

You are requested to please award your score rating as observed by you in the product on its critical examination by you, against the following parameters.

Guidelines:

- Examine the colour and appearance of the samples.
- Examine the consistency of samples.
- Examine the flavour and taste of the given samples.
- Examine the overall acceptability of the samples.

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Hedonic rating</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Excellent</td>
<td>9</td>
</tr>
<tr>
<td>2</td>
<td>Very good</td>
<td>8</td>
</tr>
<tr>
<td>3</td>
<td>Good</td>
<td>7</td>
</tr>
<tr>
<td>4</td>
<td>Fair</td>
<td>6</td>
</tr>
<tr>
<td>5</td>
<td>Neither good nor bad</td>
<td>5</td>
</tr>
<tr>
<td>6</td>
<td>Slightly undesirable</td>
<td>4</td>
</tr>
<tr>
<td>7</td>
<td>Poor</td>
<td>3</td>
</tr>
<tr>
<td>8</td>
<td>Very poor</td>
<td>2</td>
</tr>
<tr>
<td>9</td>
<td>Unacceptable</td>
<td>1</td>
</tr>
</tbody>
</table>
## Score lines:

<table>
<thead>
<tr>
<th>Attributes</th>
<th>TBR₁</th>
<th>TBR₂</th>
<th>TBR₃</th>
<th>TBR₁</th>
<th>TBR₂</th>
<th>TBR₃</th>
<th>TBR₁</th>
<th>TBR₂</th>
<th>TBR₃</th>
<th>TBR₁</th>
<th>TBR₂</th>
<th>TBR₃</th>
<th>TBR₁</th>
<th>TBR₂</th>
<th>TBR₃</th>
<th>TBR₁</th>
<th>TBR₂</th>
<th>TBR₃</th>
</tr>
</thead>
<tbody>
<tr>
<td>Colour and appearance</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Consistency</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Flavour and taste</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Overall acceptability</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Average………………

Remarks……………

Date………………… Signature………………
APPENDIX-B

Standardization of milk for the preparation of milk based dessert.

Procedure:

Standardization is a process of adjusting the composition of milk to the desired level of fat, SNF (Solid Not Fat) or both. If the given sample of milk contains more fat than as required then the excess fat is either removed in the form of cream by separating milk or added to the skimmed milk. In case the fat content is less then the desired output, the calculated quantity of cream is added to have the desired fat level in the milk.

For increasing the SNF calculated quantity of skimmed milk powder is to be added to have the desired level of SNF in milk.

In this experiment, since milk was used and the sample obtained from Student Training Dairy, it had more than the desired fat and less than the desired SNF, therefore, the calculated quantity of skimmed milk for fat and skimmed milk powder for SNF was added into the milk to have the desired fat and SNF percentage.
**APPENDIX – C**

**Determination of moisture.**

**Principle:**
The sample was heated at specified temperature for specified period of time and the loss in weight was recorded as moisture content of the sample.

**Procedure:**
- 5 g of the sample was weighted and taken in a tared porcelain dish (W₁ g)
- Dish was shaken till the contents were evenly distributed.
- Then dish was placed in hot air oven, maintained at 105° C ± 2° C and dried for at least 2 hours.
- Dish was then cooled in desiccators and weighed.
- The lowest weight was noted (W₂ g).

**Observation:**
- Tare weight of the dish (W g)
- Weight of dish with samples (W₁ g)
- Weight of the dish ± sample after drying in oven (W₂ g)

**Calculation:**

Percent moisture content = \( \frac{\text{Loss in weight}}{\text{Initial weight of the sample}} \times 100 \)

\[ = \frac{W₁ - W₂}{W₁ - W} \times 100 \]
Determination of crude fat.

Principle:

The sample of milk based dessert was placed in a continuous extractor (Soxhlet) and subjected to extraction with ether. The ether soluble substances thus removed are collected in a flask, dried and weighed. The material extracted include beside the triglycerides, material such as phospholipids, sterols, essential oils, pigments, waxes etc., hence term ‘crude fat’ if the sample contains water-soluble sugars as in molasses, the weighed sample should be washed with water and dried before extraction.

Apparatus:
Soxhlet extractor: the extractor consists of:
  a. The extraction flask.
  b. The extraction carrying the thimble and
  c. The condenser.

Procedure:
  • Extraction flask was weighed accurately (W₁ g).
  • Accurately weighed 2 g of the sample transferred into extraction thimble and the thimble was carefully placed in the extractor so that it was within its siphon height.
  • Weighed extraction flask was connected to the extractor carrying the thimble.
  • Sufficient petroleum ether was poured into the extractor to start the siphon and then filled about half the extraction flask.
  • Extraction connected to the condenser and flask was heated on a water bath or electric mental for 3 hours. The heat vaporizes the solvent and condensed in the condenser.
  • The condensed solvent falls drop-wise into thimble.
The solvent extracts the fat present in the food. When the level of the solvent reached the siphon height, the whole of the ether flowed down into the flask below taking along with the extracted fat behind and the process was repeated.

At the end of 3 hours by which time, at least 10-15 siphoning were taken, flask was removed carefully.

The extract was transferred in a tarred conical flask and solvent was evaporated.

Cooled in a dessicator and weighed (W₁ g).

Drying, cooling and weighing or successive weighing not differing by more than 0.0002g were obtained, last weight recorded (W₂ g).

**Observation:**

- Weight of sample (W)
- Weight of flask (W₁)
- Weight of flask + fat (W₂)
- (weight of flask + fat) – (weight of flask) = (W₂-W₁)

**Calculation:**

Percentage of ether extract was calculated by multiplying the increase in weight of the extraction flask by 100.

\[
\text{Percentage fat sample} = \frac{W}{W₂-W₁} \times 100
\]
DETERMINATION OF PROTEIN PERCENT OF MILK BASED DESSERT

Procedure:
1. Accurately weighed 1 g of the sample was taken in a cupped filter paper.
2. Filter paper and contents were transferred to the Kjeldhal flask.
3. 10 g digestion mixture (CuSO₄ + K₂SO₄, 4: 96) and 25 ml of concentrated H₂SO₄ were added.
4. Kjedahl flask with contents were heated slowly and carefully to minimize frothing. After sometime heat was increased and boiling continued/further for an hour until the solutions become clear.
5. Solution was transferred to a 250 ml volumetric flask and volume made up by using distilled water.
6. 10 ml of aliquot was added in the receiver of distillation apparatus after which 10 ml of 40% NaOH was added.
7. Ammonia released was collected in 25 ml of 4% boric acid solution containing few drops of mixed indicator. (Mixed indicator gives pink colour in acid, which turns to blue by ammonia on distillation)
8. Distilled for half an hour and then condense outlet was disconnected.
9. Boric acid solution was titrated with 0.01 N sulphuric acid
10. Blank determination was carried out by using water in place of the sample and by deducing this titre from acid litre.

Observation:-
Volume of 0.01 NH₂SO₄ for the sample = A
Volume of 0.01 NH₂SO₄ for the sample = B
Weight of sample = W (g)
Volume made (V) = 250 ml
Aliquot distilled = 10 ml
Calculation:

7ml of 0.01 NH$_2$SO$_4$ (N) = 0.0014 g (N)
titre value = A-B ml

Percentage nitrogen = \( \frac{A-B \times 0.0014 \times V \times 100}{W \times V_1} \)

Conversion factor = 6.25
APPENDIX - F

Determination of carbohydrate by difference:

Total carbohydrate by difference was calculated by subtracting the sum percentage of protein, fat, ash and moisture. Carbohydrate was divided into two groups’ crude fiber and nitrogen free extract (NFE). NFE was calculated by subtracting the sum of percentage of ash, fat, protein and moisture from hundred.

Calculation:

Carbohydrate by difference (Nitrogen free extract):

\[(\text{Percent}) = 100 - (\text{Moisture} \% + \text{ash} \% + \text{fat} \% + \text{protein} \%)]
Determination of total ash:

**Principle:**
Ash comprises of the mineral content which was present in the foodstuff which can be determined by igniting unknown amount of dried material in a muffle furnace.

**Procedure:**
- Took the dried material obtained from determination of moisture in a crucible dish.
- This dried material was ignited on a blue flame of a burner till the smoke was given off.
- The porcelain / crucible dish was then heated in a muffle furnace maintained at 500 ± 5° C for 1-2 hours.
- It was cooled in a dessicator and weight was taken.

**Observation:**
- Weight of the dish + weight of dried sample = (W₂ g)
- Weight of dish+ with of ash = (W₃ g)

**Calculation:**

\[
\text{Percentage of ash} = \frac{\text{Weight of dish after ignition}}{\text{Weight of sample}} \times 100
\]

\[
= \frac{W_3 - W}{W_1 - W} \times 100
\]
Determination of total solids percentage in product

Procedure:
1. Weighed accurately the clean, dry empty dish with lid.
2. Took 5 ml of the sample and transfer it to weigh quickly with the lid on.
3. Placed the dish uncovered on a boiled water bath at least for 30 minutes.
4. Removed the dish uncovered from water bath, wiped the bottom and kept the dish in a hot air oven a silica triangle and heated at 98°- 100°C for about 3 hours, placing the lid nearby.
5. After three hours, covered the dish immediately, transfer it to a desiccator, allow it to cool for about 30 minutes.
6. Weighed the dish with the lid on.
7. Returned the dish, uncovered and the lid to the oven and heat for 1 hour.
8. Removed it to the desiccator, cooled and weighed as before, repeat if necessary until the loss of weight between successive weights does not exceeded 0.5 mg.

Calculation:
Weight of sample = \(W_1 - W\) g.
Weight of total solids in sample = \(W_2 - W\) g.

\[
\text{Percentage of total solid} = \left(\frac{W_2 - W}{W_1 - W}\right) \times 100
\]

Where,
Weight of the dish + lid = \(W\) g.
Weight of the dish + lid + sample = \(W_1\) g.
Weight of the dish + lid + residue after drying = \(W_2\) g.
APPENDIX - I

Energy value
Energy value of the food sample can be calculated by multiplying the figure for percentage of protein, fat and carbohydrate by 4, 9 and 4 respectively and adding the figures obtained.

Calculation:

Calorific value (Kcal/g) = (% protein × 4) + (% fat × 9) + (% carbohydrate × 4)
APPENDIX-J

FORMULA USED FOR STATISTICAL ANALYSIS

Analysis of Variance:
\[ G = T_1 + T_2 + T_3 + \ldots + T_n = R_1 + R_2 + R_3 + \ldots + R_n \]

1. Correction factor (CF) = \( \frac{G^2}{rt} \)

2. Treatment S.S. = \( \sum T_i^2 + \frac{T_1^2 + T_2^2 + \ldots + T_n^2 - CF}{r} \)

3. Replication S.S. = \( \sum R_i^2 + \frac{R_1^2 + R_2^2 + \ldots + R_n^2 - CF}{t} \)

4. Total S.S. = Sum of square of each observation − CF

5. Error S.S. = Total S.S. − S.S. due to treatments − S.S. due to replications

Where,

G = Grand total

t = Treatment = 18

r = Replication = 3

S.S. = Sum of Squar Factors: Two (T and M)s
3 x 2 x 3 Factorial Design:

Factors: Three (T, B and R)

### SKELETON OF ANOVA TABLE

<table>
<thead>
<tr>
<th>Sources of variation</th>
<th>d.f.</th>
<th>S.S.</th>
<th>M.S.S.</th>
<th>F(cal)</th>
<th>F tab (5 %)</th>
<th>F tab(1 %)</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>Due to replication</td>
<td>r-1</td>
<td>R.S.S</td>
<td>M. R.S.S. = R.S.S.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>r-1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Due to level of milk(T)</td>
<td>t-1</td>
<td>S.S.T</td>
<td>M.S.S.(T) = S.S.(T)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>p-1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Due to Bottle gourd (B)</td>
<td>b-1</td>
<td>S.S.B</td>
<td>M.S.S.(B) = S.S.(B)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>q-1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Due to Rice powder (R)</td>
<td>r-1</td>
<td>S.S.R</td>
<td>M.S.S.(R) = S.S.(R)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>n-1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Due to interaction (TxB)</td>
<td>(t-1)(b-1)</td>
<td>Int S.S.TxB</td>
<td>M.Int.S.S.(TxB) = Int S.S.(TxB)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(p-1) (q-1)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Due to interaction (TxR)</td>
<td>(t-1)(r-1)</td>
<td>Int S.S.TxR</td>
<td>M.Int.S.S.(TxR) = Int S.S.(TxR)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(p-1) (n-1)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Due to interaction (BxR)</td>
<td>(b-1)(r-1)</td>
<td>Int S.S.BxR</td>
<td>M.Int.S.S.(BxR) = Int S.S.(BxR)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(p-1) (n-1)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Due to interaction (TXBxR)</td>
<td>(t-1)(b-1)(r-1)</td>
<td>Int S.S.TxBxR</td>
<td>M.Int.S.S.(BxR) = Int S.S.(BxR)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(p-1) (q-1) (n-1)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Due to Error</td>
<td>(r-1)(tbr-1)</td>
<td>E.S.S</td>
<td>E.M.S.S. = E.S.S.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(pqn-1)(r-1)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>rtr-1</td>
<td>T.S.S</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Critical difference (C.D) for Milk

\[ S.E. (M) = \sqrt{2} \times E.M.S.S. / r \times t \]

\[ C.D. = S.E. (T) \times t \times (5\%) \text{ on error degrees of freedom} \]

Where,

\( S.E. = \text{Standard Error} \)

\( E.M.S.S. = \text{Error Mean Sum of Square} \)

Critical difference (C.D) for Interaction (T x B)

\[ S.E. (m) = \sqrt{2} \times E.M.S.S. / r \]

\[ C.D. = S.E.(m) \times t \times (5\%) \text{ on error degrees of freedom} \]

Where,

\( S.E. = \text{Standard Error} \)

\( E.M.S.S. = \text{Error Mean Sum of Square} \)