Progressive Research 9 (Special) : 488-491 (2014) *Society for Sci. Dev. in Agric. and Tech.*

EFFECT OF FAT LEVELS, SUGAR LEVELS, FLAVOURING AGENTS AND STORAGE PERIODS ON SWEETNESS SCORE OF FLAVOURED MILK

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ABSTRACT

Growth of yeasts in sweetened flavoured Yoghurt was related to the abilities of the yeasts in sweetened Yoghurt to grow at refrigeration temperature. Different levels of fat, sugar, flavouring agents and storage periods were used for the preparation of Flavoured milk. The observations with regard to sensory evaluation (flavour, colour and appearance, sweetness and overall acceptability) chemical characteristics (total solids, fat, protein, sucrose, acidity and ash) and microbiological quality (standard plate count, coliform and yeasts and moulds count) were recorded. The data thus obtained were analyzed statistically by using factorial completely randomized design. The sweetness score of flavoured milk was affected significantly by fat levels. The maximum (7.13) score was found in A_2 samples. The sweetness score of Flavoured milk was affected significantly by different sugar levels. The maximum (7.19) and minimum (6.48) score were found in B_2 and B_4 samples, respectively. The sweetness score of Flavoured milk was affected significantly by different flavouring agents. The highest score (7.06) was found by addition of vanilla flavour (A_1) and lowest (6.59) was noted in mango flavour (C_3). So far as storage periods of Flavoured milk, envisages that highest sweetness score (7.71) was noted at zero day storage (D_1), while lowest in D5 (6.01). The fat, sugar, flavouring agents and storage periods also influenced the sweetness score of Flavoured milk. The maximum score (8.60) was noted in $A_2B_2C_1D_1$ samples which were graded as excellent quality and liked extremely and minimum score (5.20) was in case of A1B4C3D5 samples and was graded as fair quality.

Key words : *Sweetness, refrigeration, yoghurt, flavoured milk and variance.*

The flavoured milk contains less sugar than other dairy foods. The excessively sweetness should be avoided. The best sugar content of the flavoured milk is 45-55 per cent (1) reviewed item by use of appropriateness of drinks varying in sweetener and fat contents. The author observed that use of skim milk was rated more appropriate than low fat milk, but chocolate milk with varying fat contents had identical profile. Those who found the drinks pleasant also assessed them more appropriate in almost all uses of context. It appropriate rating were low, pleasantness made very little difference to the level of appropriateness. (2) showed that about 48.3 percent sample of the milk sweets in rural areas in U.P. contained non permitted synthetic colours.

Most popular flavours used in the manufacture of sweetened flavoured Yoghurt are cocoa, strawberry, pineapple and raspberry (3). The sweetness of flavoured milk as affected by different factors.

MATERIALS AND METHODS

The different levels of fat, sugar, flavouring agents and storage periods were used for the preparation of flavoured milk. The observations with regard to sensory evaluation (flavour, colour and appearance, sweetness and overall acceptability) chemical characteristics (total solids, fat, protein, sucrose, acidity and ash) and microbiological quality (standard plate count, coliform and yeasts and moulds count) were recorded. The data thus obtained were analyzed statistically by using factorial completely randomized design. The Flavoured milk was prepared from cow milk. Cow milk standardized three fat levels viz. 2, 2.5 and 3.0%, sugar (4%, 5%, 6% and 7%), flavouring agents (vanilla, pineapple, and mango) and storage periods 0, 3, 6, 9 and 12 days were used for the preparation of Flavoured milk. The standard error of difference of two means was calculated with the help of the following expressions, suitable for different comparisons.

(i) S.E. difference $= \sqrt{\frac{2V_E}{N}}$

Where,

V_E = Error of M.S.

N = Number of observations on which the means were based.

(ii) $= \sqrt{\left(\frac{1}{N_1} + \frac{1}{N_2} V_E\right)}$

Where,

N_1 and N_2 the numbers of observations on which the two means were based.

The critical difference for comparing the two means was calculated with the help of following expression:–

C.D. at 5% level = (S.E. of difference) ´ t at 5% p level for error d.f.

RESULTS AND DISCUSSION

The flavoured milk contains less sugar than other dairy foods. The excessively sweetness should be avoided. The best sugar content of the flavoured milk is 45-55 per cent. The sweetness of flavoured milk as affected by different factors has been presented in Table-1 and Table-2 and its analysis of variance in Table-3 and illustrated by Figure-1, which revealed the following facts:

Table-1 represented that the mean value of sweetness score of Flavoured milk samples prepared from different fat levels indicated that highest score (7.13) was found in A_2 samples followed by A_3 and lowest score (6.53) in A_1 samples. The mean differences of sweetness score varied significantly from one another when compared with CD at 5% level of significance. While comparing the average sweetness scores of flavoured milk on account of different sugar levels, it was observed that the best score (7.19) was noted when the samples contained 5 per cent sugar (B_2) followed by B_3, B_1 and lowest score (6.48) in case of 7% sugar (B_4) samples.

Above results indicated that 5% sugar level was most suitable as compared to 4, 6 and 7% sugar levels. The findings closely agreed with the findings of (4, 5) who reported that sugar concentration influenced the sensory and rheological acceptability. Similarly, the highest score (7.06) was found in samples containing vanilla (C_1) followed by pineapple (C_2) and mango (C_3) when the interactional impact of flavouring agents (C) on sweetness scores of flavoured milk were compared. So, for as the storage periods are concerned, the fresh samples contained the maximum score (7.71) followed by D_2 (7.25). The minimum score (6.01) was observed when samples were stored for 12 days (D_5). An inverse relationship between sweetness scores and storage periods was also observed which may be due to bacterial decomposition. These findings closely agreed with the finding of (6) who reported that the product showed a decreasing trend during storage.

Table-1 denoted the mean interactions between fat level (A) and sugar levels (B). The Flavoured milk prepared with 2.5 per cent fat level and 5 per cent sugar (A_2B_2) contained maximum score (7.39) followed by A_2B_3 (7.26), while minimum (6.12) in A_1B_4 samples. The interactional effect between level of fat and flavouring agents (A.C) revealed a maximum score of (7.34) in A_2C_1 (2.5 per cent fat level with vanilla flavour) followed by A_2C_2 (7.21) and minimum score (6.30) noted in A_1C_3 samples. The results varied significantly.

Similarly, a maximum and minimum scores of (8.00) and (5.70) were noted in treated samples A_2D_1 and A_1D_5, respectively, when the interactions between fat level and storage periods were compared. The mean differences varied significantly. Similar results were also reported by (6) who reported that the product showed a decreasing trend during storage.

So far as the interaction of sugar levels and flavouring agents are concerned the treatment B_2C_1 exhibited the maximum (7.42) followed by (B_2C_2) score (7.26), while minimum score (6.20) was observed in B_4C_3 samples. The interactions between (B.D) also denoted that fresh samples with 5% sugar level scored highest (8.13) followed by B_3D_1 (7.93) and B_4D_5 expressed the lowest (5.70) when compared statistically. Among the treatment combinations of flavouring agents and storage periods (C.D) for sweetness score of Flavoured milk. It was observed that maximum score (7.92) in case of C_1D_1 followed by C_2D_1 (7.71), while minimum score (5.76) was observed in C_3D_5 samples. These values differed significantly when compared with CD at 5%.

Table-1 : Effect of fat levels (A), sugar levels (B), flavouring agents (C) and storage periods (D) on sweetness score of flavoured milk.

	B_1	B_2	B_3	B_4	C_1	C_2	C_3	D_1	D_2	D_3	D_4	D_5	Mean
A_1	6.36	6.93	6.73	6.12	6.76	6.54	6.30	7.37	6.98	6.48	6.14	5.70	6.53
A_2	7.03	7.39	7.26	6.84	7.34	7.21	6.84	8.00	7.48	7.20	6.67	6.28	7.13
A_3	6.70	7.25	7.04	6.48	7.09	6.89	6.62	7.76	7.28	6.80	6.45	6.04	6.87
B_1					6.98	6.70	6.40	7.55	7.10	6.61	6.30	5.92	6.69
B_2					7.42	7.17	6.98	8.13	7.63	7.15	6.74	6.29	7.19
B_3					7.26	7.00	6.76	7.93	7.46	6.96	6.57	6.12	7.01
B_4					6.60	6.44	6.20	7.24	6.80	6.60	6.07	5.70	6.48
C_1								7.92	7.45	7.05	6.65	6.25	7.06
C_2								7.71	7.27	6.96	6.44	6.01	6.88
C_3								7.50	7.02	6.48	6.17	5.76	6.59
Mean								7.71	7.25	6.83	6.42	6.01	

	A	B	C	D	AB	AC	AD	BC	BD	CD
SE(diff.)	0.019	0.022	0.019	0.025	0.038	0.033	0.043	0.038	0.050	0.043
CD at (5%)	0.032	0.036	0.032	0.041	0.063	0.055	0.071	0.063	0.082	0.071

Table-2 revealed the interactional effect of different levels of fat, sugar, flavouring agents and storage periods (ABCD) on sweetness score of Flavoured milk. The maximum score (8.60) was recorded in samples prepared by 2.5 per cent fat, 5 per cent sugar, with vanilla flavour at zero day storage ($A_2B_2C_1D_1$) followed by $A_2B_3C_1D_1$, $A_3B_2C_1D_1$, $A_2B_2C_2D_1$, $A_2B_1C_1D_1$, $A_3B_3C_1D_1$, $A_2B_3C_2D_1$ and $A_3B_2C_2D_1$ which were statistically at par and were graded excellent in quality and liked extremely, while the combination of $A_1B_4C_3D_5$ scored minimum (5.20) and was graded as fair in quality.

From analysis of variance Table-3 for sweetness of Flavoured milk, it was observed that main effects of A B C and D were found to be highly significant. The first and second order interactions (AB, AC, BC, AD, BD, CD) and (ABC) were also found to be significant, respectively, while all others were observed to be non-significant.

CONCLUSION

The sweetness score of Flavoured milk was affected significantly by fat levels. The maximum (7.13) score was found in A_2 samples, while minimum score (6.53) was noted in A_1 sample. The sweetness score of

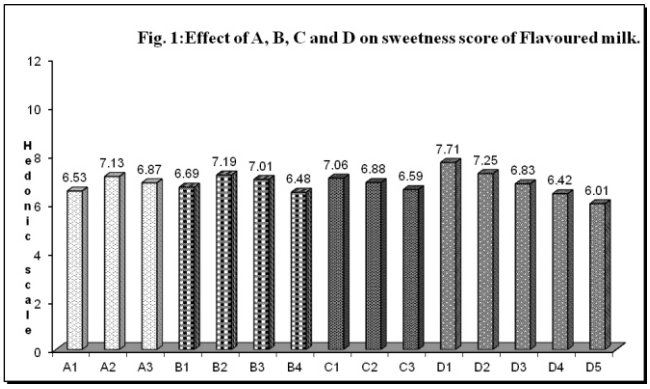
Table-2 : Means of sweetness score of Flavoured milk as affected by different treatment combinations of ABCD.

		C_1					C_2					C_3				
		D_1	D_2	D_3	D_4	D_5	D_1	D_2	D_3	D_4	D_5	D_1	D_2	D_3	D_4	D_5
A_1	B_1	7.40	7.00	6.60	6.20	5.80	7.20	6.80	6.30	6.00	5.60	6.90	6.50	6.00	5.70	5.40
	B_2	8.00	7.60	7.20	6.80	6.30	7.80	7.40	6.90	6.50	6.00	7.60	7.20	6.60	6.30	5.80
	B_3	7.80	7.40	7.00	6.60	6.10	7.60	7.20	6.70	6.30	5.80	7.40	7.00	6.40	6.10	5.60
	B_4	7.10	6.70	6.30	5.90	5.50	5.90	6.70	6.00	5.80	5.40	6.80	6.30	5.80	5.50	5.20
A_2	B_1	8.20	7.70	7.30	6.90	6.60	7.90	7.40	6.90	6.60	6.20	7.70	7.10	6.70	6.40	5.90
	B_2	8.60	8.00	7.70	7.20	6.80	8.40	7.80	7.30	6.80	6.50	8.20	7.60	7.10	6.70	6.10
	B_3	8.40	7.90	7.50	7.10	6.70	8.20	7.70	7.20	6.80	6.40	8.00	7.50	6.90	6.50	6.10
	B_4	7.70	7.20	6.70	6.50	6.10	7.50	7.10	8.80	6.50	6.20	7.30	6.80	6.40	6.10	5.70
A_3	B_1	7.80	7.40	7.00	6.60	6.20	7.60	7.20	6.70	6.30	5.90	7.30	6.80	6.00	6.00	5.70
	B_2	8.40	7.80	7.40	6.90	6.60	8.20	7.70	7.20	6.80	6.30	8.00	7.60	7.00	6.70	6.20
	B_3	8.20	7.70	7.30	6.90	6.40	8.00	7.50	7.00	6.60	6.10	7.80	7.30	6.70	6.30	5.90
	B_4	7.50	7.00	6.60	6.30	5.90	7.30	6.80	6.60	6.30	5.80	7.10	6.60	6.20	5.80	5.50

Table-3 : Analysis of variance for sweetness score of flavoured milk.

Source	D.F.	M.S.S.	F.
A	2	15.8942	1995.332***
B	3	13.5367	1358.698***
C	2	10.3547	1039.323***
D	4	48.5260	4870.638***
AB	6	0.1904	19.109***
AC	4	0.0697	7.000***
BC	6	0.3118	31.293***
AD	8	0.0936	9.396***
BD	12	0.1568	15.738***
CD	8	0.1145	11.495***
ABC	12	0.1377	13.817***
ABD	24	0.0013	0.197NS
ACD	16	0.0005	0.073NS
BCD	24	0.0002	0.027NS
ABCD	48	0.0003	0.002NS
Error	360		

Note: NS = Non-significant at 5% level of significance
*= Significant at 5% level of significance
**= Significant at 1% level of significance



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