CHAPTER V

SUMMARY

AND

CONCLUSION
5. SUMMARY AND CONCLUSION

The present study “DEVELOPMENT OF LOW FAT DIETETIC FERMENTED DAIRY DRINK” was conducted with the following objectives.

1. To develop suitable technology for preparation of dietetic fermented dairy drink.
2. To ascertain the level of fat in milk suitable for the production of dietetic fermented dairy drink.
3. To study the effect of level of cereals on the quality of dietetic fermented dairy drink.
4. To evaluate the organoleptic quality, chemical quality, microbiological quality and energy value of dietetic fermented dairy drink.
5. To work out cost of the product.

Three different ratio of milk fat and four different level of cereal i.e. cornflakes powder was used in the present experimental work. Dietetic fermented dairy drink prepared from different treatment combinations were compared with each other. The different treatment combinations used in the experiment are represented as follows:

F₁C₁ : Dietetic fermented dairy drink prepared from milk containing 0.5 percent milk fat and 4 percent cornflakes powder.
F₁C₂ : Dietetic fermented dairy drink prepared from milk containing 0.5 percent milk fat and 6 percent cornflakes powder.
F₁C₃ : Dietetic fermented dairy drink prepared from milk containing 0.5 percent milk fat and 8 percent cornflakes powder.
F₁C₄ : Dietetic fermented dairy drink prepared from milk containing 0.5 percent milk fat and 10 percent cornflakes powder.
F₂C₁ : Dietetic fermented dairy drink prepared from milk containing 1.5 percent milk fat and 4 percent cornflakes powder.
F₂C₂: Dietetic fermented dairy drink prepared from milk containing 1.5 percent milk fat and 6 percent cornflakes powder.

F₂C₃: Dietetic fermented dairy drink prepared from milk containing 1.5 percent milk fat and 8 percent cornflakes powder.

F₂C₄: Dietetic fermented dairy drink prepared from milk containing 1.5 percent milk fat and 10 percent cornflakes powder.

F₃C₁: Dietetic fermented dairy drink prepared from milk containing 3 percent milk fat and 4 percent cornflakes powder.

F₃C₂: Dietetic fermented dairy drink prepared from milk containing 3 percent milk fat and 6 percent cornflakes powder.

F₃C₃: Dietetic fermented dairy drink prepared from milk containing 3 percent milk fat and 8 percent cornflakes powder.

F₃C₄: Dietetic fermented dairy drink prepared from milk containing 3 percent milk fat and 10 percent cornflakes powder.

The different samples of dietetic fermented dairy drink for each replication were evaluated for moisture, fat, protein, carbohydrate, ash, total solids, acidity, organoleptic qualities like flavour and taste, consistency, colour and appearance and overall acceptability, microbiological qualities like yeast and mould count and coliform, cost of product and energy value.

Data obtained on these aspects were statistically analyzed by using factorial design and critical difference (CD) techniques.

The results after the analysis of dietetic fermented dairy drink and conclusion there from are as follows:
MOISTURE CONTENT IN DIETETIC FERMENTED DAIRY DRINK

Highest percent moisture of 91.8 was recorded in F1C1 followed by F2C1 (90.81), F3C1 (90.71), F1C2 (89.85), F2C2 (89.01), F3C2 (88.78), F1C3 (88.26), F2C3 (87.44), F3C3 (87.21), F1C4 (86.73), F2C4 (85.93) and F3C4 (85.71). Moisture content of dietetic fermented dairy drink differed significantly in most of the treatment combinations. Difference in moisture percentage of different treatment combinations was attributed due to addition of 50 per cent of water in the product.

On comparison the mean values of fat level against the critical difference value, significant difference was observed between F1 and F3 (1.05), F1 and F2 (0.83) and F2 and F3 (0.23). The average value of F1 (89.16) was highest and it differs significantly from all other fat levels. So it can be regarded as the best and on comparison the mean values of cornflakes ratio against the critical difference value, significant difference was observed between the mean values of C1 and C4 (5.03), C1 and C3 (3.51), C1 and C2 (1.94), C2 and C4 (3.09), C2 and C3 (1.57) and C3 and C4 (1.52). The average value of C1 (91.15) was highest and it differs significantly from all other cornflakes ratio. So it can be regarded as the best.

FAT CONTENT IN DIETETIC FERMENTED DAIRY DRINK

Highest percent fat of 1.51 was recorded in F3C1 followed by F3C2 (1.5), F3C3 (1.48), F3C4 (1.47), F2C1 (0.81), F2C2 (0.8), F2C3 (0.8), F2C4 (0.8), F1C4 (0.35), F1C3 (0.35), F1C2 (0.34) and F1C1 (0.32). Fat content of dietetic fermented dairy drink differed significantly in most of the treatment combinations. Fat variation was attributed due to addition of different level of milk fat and cornflakes powder level in dairy drink.

On comparison the mean values of fat level against the critical difference value, significant difference was observed between F3 and F1 (1.15), F3 and F2 (0.69) and F2 and F1 (0.46). The average value of F3 (1.49) was highest and it differs significantly from all other fat levels. So it can be regarded as the best and on comparison the mean values of cornflakes ratio against the critical difference value, significant difference was observed between the mean values of C1 and C4 (0.009), C1 and C3 (0.005), C2 and C4 (0.007). The average value of C1 (0.881) was
highest and it differs significantly from the maximum number of combination. So this combination can be regarded as the best one.

**PROTEIN CONTENT IN DIETETIC FERMENTED DAIRY DRINK**

Highest percent protein of 2.51 was recorded in F2C4 followed by F2C3 (2.40), F1C4 (2.37), F3C4 (2.33), F2C2 (2.31), F1C3 (2.27), F3C3 (2.23), F1C2 (2.16), F2C2 (2.12), F2C1 (1.91), F1C1 (1.77) and F3C1 (1.72). Protein content of dietetic fermented dairy drink differed significantly in most of the treatment combinations. Protein variation was attributed due to addition of different level of cornflakes powder in dairy drink.

On comparison the mean values of fat level against the critical difference value, significant difference was observed between F2 and F3 (0.18), F2 and F1 (0.14) and F1 and F3 (0.04). The average value of F2 (2.28) was highest and it differs significantly from all other fat levels. So it can be regarded as the best and on comparison the mean values of cornflakes ratio against the critical difference value, significant difference was observed between the mean values of C4 and C1 (0.6), C4 and C2 (0.21), C4 and C3 (0.1), C3 and C1 (0.5), C3 and C2 (0.11) and C2 and C1 (0.39). The average value of C4 (2.4) was highest and it differs significantly from all other cornflakes ratio. So it can be regarded as the best.

**TOTAL CARBOHYDRATE CONTENT IN DIETETIC FERMENTED DAIRY DRINK**

Highest percent carbohydrate of 10 was recorded in F2C4 followed by F1C4 (9.78), F3C4 (9.77), F2C3 (8.64), F3C3 (8.41), F1C3 (8.41), F2C2 (7.23), F3C2 (7.00), F1C2 (7.00), F2C1 (5.77), F3C4 (5.53) and F1C1 (5.53). In most of the treatment combinations carbohydrate content differed significantly. Carbohydrate variation was attributed due to addition of different level of cornflakes powder in dairy drink.

On comparison the mean values of fat level against the critical difference value, significant difference was observed between F2 and F3 (0.24), F2 and F1 (0.23) and F1 and F3 (0.01). The average value of F2 (7.91) was highest and it differs significantly from all other fat levels. So it can be regarded as the best and on comparison the mean values of cornflakes ratio against the critical difference value, significant difference was observed between the mean values of C4
and C₁ (4.24), C₄ and C₂ (2.77), C₄ and C₃ (1.36), C₃ and C₁ (2.88), C₃ and C₂ (1.41) and C₂ and C₁ (1.47). The average value of C₄ (9.85) was highest and it differs significantly from all cornflakes ratio. So it can be regarded as the best.

**ASH CONTENT IN DIETETIC FERMENTED DAIRY DRINK**

Highest percent ash of 0.77 was recorded in F₁C₄ followed by F₂C₄ (0.76), F₃C₄ (0.73), F₂C₃ (0.71), F₁C₃ (0.71), F₂C₃ (0.67), F₂C₂ (0.65), F₁C₂ (0.65), F₃C₂ (0.60), F₁C₁ (0.58), F₂C₁ (0.58) and F₃C₁ (0.53). Ash content of dietetic fermented dairy drink differed significantly in most of the treatment combinations. Ash variation was attributed due to the level variation of milk fat and cornflakes powder.

On comparison the mean values of fat level against the critical difference value, significant difference was observed between F₁ and F₃ (0.06) and F₂ and F₃ (0.05). The average value of F₁ (0.68) was highest and it differs significantly from all other fat levels. So it can be regarded as the best and on comparison the mean values of cornflakes ratio against the critical difference value, significant difference was observed between the mean values of C₄ and C₁ (0.19), C₄ and C₂ (0.12), C₄ and C₃ (0.06), C₃ and C₁ (0.13), C₃ and C₂ (0.06) and C₂ and C₁ (0.07). The average value of C₄ (0.75) was highest and it differs significantly from all other cornflakes ratio. So it can be regarded as the best.

**TOTAL SOLIDS CONTENT IN DIETETIC FERMENTED DAIRY DRINK**

Highest percent total solids of 14.29 was recorded in F₃C₄ followed by F₂C₄ (14.07), F₁C₄ (13.27), F₂C₃ (12.79), F₂C₃ (12.55), F₁C₃ (11.74), F₃C₂ (11.22), F₂C₂ (10.99), F₁C₂ (10.15), F₁C₁ (9.29), F₂C₁ (9.07) and F₁C₁ (8.20). Total solids content of dietetic fermented dairy drink differed significantly in most of the treatment combinations. Total solids variation was attributed due to addition of different level of cornflakes powder and spices in dairy drink.

On comparison the mean values of fat level against the critical difference value, significant difference was observed between F₃ and F₁ (1.06), F₃ and F₂ (0.23) and F₂ and F₁ (0.83). The average value of F₃ (11.90) was highest and it differs significantly from all other fat levels. So it can be regarded as the best and on comparison the mean values of cornflakes ratio against
the critical difference value, significant difference was observed between the mean values of C₄ and C₁ (5.03), C₄ and C₂ (3.09), C₄ and C₃ (1.52), C₃ and C₂ (3.51), C₃ and C₁ (1.57) and C₂ and C₁ (1.94). The average value of C₄ (13.88) was highest and it differs significantly from all other cornflakes ratio. So it can be regarded as the best.

ACIDITY CONTENT IN DIETETIC FERMENTED DAIRY DRINK

Highest percent acidity of 0.71 was recorded in F₂C₁ followed by F₂C₂ (0.71), F₂C₃ (0.71), F₂C₄ (0.71), F₃C₁ (0.69), F₃C₂ (0.69), F₃C₃ (0.69), F₃C₄ (0.69), F₁C₁ (0.69), F₁C₂ (0.69), F₁C₃ (0.69) and F₁C₄ (0.69). There was non significant difference in the different treatment combinations.

FLAVOUR AND TASTE SCORE OF DIETETIC FERMENTED DAIRY DRINK

Highest flavour and taste score of dietetic fermented dairy drink sample 8.68 was recorded in F₃C₃ followed by F₁C₃ (8.44), F₂C₃ (8.44), F₂C₄ (8.28), F₃C₂ (8.08), F₂C₄ (8.08), F₁C₄ (8.04), F₂C₂ (7.96), F₁C₂ (7.92), F₃C₁ (7.64), F₂C₁ (7.48) and F₁C₁ (7.28). The difference was found to be significant in most of the treatment combinations. Difference in flavour and taste of dietetic fermented dairy drink was probably due to the typical flavour of corn flakes powder added in dietetic fermented dairy drink.

On comparison the mean values of fat level against the critical difference value, significant difference was observed between F₃ and F₁ (0.25), F₃ and F₂ (0.18) and F₂ and F₁ (0.07). The average value of F₃ (8.17) was highest and it differs significantly from all other fat levels. So it can be regarded as the best and on comparison the mean values of cornflakes ratio against the critical difference value, significant difference was observed between the mean values of C₃ and C₁ (1.06), C₃ and C₂ (0.54), C₃ and C₄ (0.39), C₄ and C₁ (0.67), C₄ and C₂ (0.15) and C₂ and C₁ (0.52). The average value of C₃ (8.52) was highest and it differs significantly from all other cornflakes ratio. So it can be regarded as the best.

CONSISTENCY SCORE OF DIETETIC FERMENTED DAIRY DRINK
Highest consistency score of dietetic fermented dairy drink 8.48 was recorded in F3C3 followed by F2C3 (8.4), F1C3 (8.36), F3C4 (8.24), F3C2 (8.16), F2C4 (8.12), F1C4 (8.04), F1C2 (8), F2C2 (7.96), F3C1 (7.76), F2C1 (7.72) and F1C1 (7.56). The difference was found to be significant in most of the treatment combinations. The difference in the consistency noted in different treatment combinations was due to variation of cornflakes powder in dairy drink.

On comparison the mean values of fat level against the critical difference value, significant difference was observed between F3 and F1 (0.17), F3 and F2 (0.11) and F2 and F1 (0.06). The average value of F3 (8.16) was highest and it differs significantly from all other fat levels. So it can be regarded as the best and on comparison the mean values of cornflakes ratio against the critical difference value, significant difference was observed between the mean values of C3 and C1 (0.73), C3 and C2 (0.37), C3 and C4 (0.28), C4 and C1 (0.45), C4 and C2 (0.09) and C2 and C1 (0.36). The average value of C3 (8.41) was highest and it differs significantly from all other cornflakes ratio. So it can be regarded as the best.

COLOUR AND APPEARANCE SCORE OF DIETETIC FERMENTED DAIRY DRINK

Highest colour and appearance score of dietetic fermented dairy drink samples 8.52 was recorded in F3C3 followed by F2C3 (8.44), F1C3 (8.28), F3C4 (8.24), F1C4 (8.16), F2C4 (8.12), F2C2 (8.04), F1C2 (7.96), F3C2 (7.92), F2C1 (7.76), F3C1 (7.72) and F1C1 (7.64). There was significant difference in most of the treatment combinations. The difference in the colour and appearance noted in different treatment combinations was due to variation of cornflakes powder and spices in dairy drink.

On comparison the mean values of cornflakes ratio against the critical difference value, significant difference was observed between the mean values of C3 and C1 (0.71), C3 and C2 (0.44), C3 and C4 (0.24), C4 and C1 (0.46), C4 and C2 (0.2) and C2 and C1 (0.26). The average value of C3 (8.41) was highest and it differs significantly from all other cornflakes ratio. So it can be regarded as the best.

OVERALL ACCEPTABILITY SCORE OF DIETETIC FERMENTED DAIRY DRINK
Highest overall acceptability score of dietetic fermented dairy drink samples 8.52 was recorded in F3C3 followed by F2C3 (8.4), F1C3 (8.34), F3C4 (8.24), F2C4 (8.1), F1C4 (8.04), F3C2 (8.02), F2C2 (7.94), F1C2 (7.92), F3C1 (7.68), F2C1 (7.6) and F1C1 (7.44). Overall acceptability score of dietetic fermented dairy drink differed significantly in most of the treatment combinations. The difference in the overall acceptability and taste noted in different treatment combinations was due to variation of milk fat and cornflakes powder.

On comparison the mean values of fat level against the critical difference value, significant difference was observed between F3 and F1 (0.18), F3 and F2 (0.1) and F2 and F1 (0.08). The average value of F3 (8.11) was highest and it differs significantly from all other fat levels. So it can be regarded as the best and on comparison the mean values of cornflakes ratio against the critical difference value, significant difference was observed between the mean values of C3 and C1 (0.85), C3 and C2 (0.46), C3 and C4 (0.29), C4 and C1 (0.56), C4 and C2 (0.17) and C2 and C1 (0.39). The average value of C3 (8.42) was highest and it differs significantly from all other cornflakes ratio. So it can be regarded as the best.

YEAST AND MOULDF COUNT OF DIETETIC FERMENTED DAIRY DRINK AT 0 DAY

Highest mean yeast and mould count per gm of dietetic fermented dairy drink samples was recorded in the treatment F2C2 (3) followed by F2C3 (3), F2C4 (2.8), F3C1 (2.8), F3C2 (2.8), F3C3 (2.8), F3C4 (2.8), F1C2 (2.8), F1C3 (2.6), F1C4 (2.4) and F1C1 (2.4). The difference was found to be non-significant within all the treatment combination.

COLIFORM COUNT OF DIETETIC FERMENTED DAIRY DRINK

In the present investigation coliforms were found to be absent in all the samples. This indicates that proper hygienic precautions had been taken during the production and packaging of dietetic fermented dairy drink.
ENERGY VALUE OF DIETETIC FERMENTED DAIRY DRINK The maximum energy value of dietetic fermented dairy drink 61.6 Kcal per 100 gm was recorded in treatment combination F3C4.

COST FOR THE PRODUCT
The average cost of production, one kg of dietetic fermented dairy drink samples i.e. F1C1, F1C2, F1C3, F1C4, F2C1, F2C2, F2C3, F2C4, F3C1, F3C2, F3C3, and F3C4, were Rs.30.05, Rs.35.29, Rs.40.34, Rs.45.21, Rs.31.36, Rs.36.57, Rs.41.60, Rs.46.45, Rs.32.67, Rs.37.86, Rs.42.86 and Rs.47.69 respectively. The cost of production of dietetic fermented dairy drink sample F1C1 (30.05) was much less than the other samples.
CONCLUSION

Importance of ready to eat dietetic fermented dairy drink is gaining momentum in developed countries. Manufacture of these products in our country too offers good scope against the background of growing industrialization, urbanization and changing food consumption pattern.

A recent trend established in the dairy industry involves combining dairy ingredients with other food components, which has provided an excellent way to utilize the nutritionally valuable components and to exploit from the synergy between the characteristics of the cereal and dairy sources. The nutritional and therapeutic attributes of fermented milks have the potential to reduce the role of medicine for maintaining normalcy in human health, thus leading to a tremendous growth of global market for yoghurt and similar fermented milk products. However the extension of the same principles to a composite food based on cornflakes powder and milk fat so as to enhance its nutritional attributes is still novel, hence the current study was undertaken to formulate a cornflakes powder-milk fat based fermented dairy drink.

From the findings of this study, it was concluded that the dietetic fermented dairy drink was prepared by the method adopted for preparation of set curd, with the slight modifications. Quantities of variable such as skim milk, milk fat and stabilizer were optimized converted into curd. Which later was churned fifty percent water, salt and spices were added to it. For flavour enhancement, cornflakes powder was added to it. Dietetic fermented dairy drink composition made according to the method of the invention exhibit good organoleptic characteristics.

The quality of dietetic fermented dairy drink prepared by low milk fat having different percentage of milk fat i.e. 0.5 percent, 1.5 percent and 3 percent indicated as $F_1$, $F_2$ and $F_3$ respectively and four different levels of cornflakes powder i.e. 4 percent, 6 percent, 8 percent and 10 percent indicated as $C_1$, $C_2$, $C_3$ and $C_4$ respectively were compared to each other.

Among the different treatment combinations of fermented dairy drink, $F_3C_3$ having 3 percent milk fat and using 8 percent cornflakes powder level was found to be superior in terms of overall acceptability over the other treatment combinations. Therefore, it is concluded
that for the overall improvement in consistency, flavour, and taste in a level of 8 percent could easily be incorporated to produce good quality dairy drink. Result finding also revealed that out of four different cornflakes level, used as enhancer for nutritional characteristics such as low in fat and high in moisture, calorie and carbohydrate content. 8 percent cornflakes level was found superior to 4 percent, 6 percent and 10 percent. The microbial quality for different treatment combinations was found to be satisfactory and the dairy drink was acceptable on the basis of microbial loads. The cost wise dietetic fermented dairy drink treatment combinations were also more economical as compared to the dairy drink available in present day market.

It is thus anticipated that dietetic fermented dairy drink will in future provide additional benefits to consumers with respect to convenience, price and health.
RECOMMENDATION

By incorporating different proportion of cornflakes powder in skim milk, various acceptable products like beverage, raita, paneer, based desserts may be prepared, which have significantly low fat, higher fibre and energy content. It is highly recommended for the people suffering from diseases like digestive, reduction in serum cholesterol, obesity and diabetes.