CONCLUSION

This study indicates that encapsulation can significantly improve the survival of probiotic bacteria in ice cream. The technology of micro encapsulation has developed from a simple immobilization or entrapment to sophisticated and precise micro capsule. The advances in this field have been tremendous with nutraceuticals and food ingredients. The physical protection of probiotics by microencapsulation is a new approach to improve the probiotic survival. Encapsulation helps to isolate the bacterial cells from the effects of the hostile environment and gastrointestinal tract, thus potentially preventing cell loss to some extent. Kebary, Hussein, and Badawi (1998) have shown that Bifidobacterium spp. survive in high numbers in frozen ice milk in beads made from alginate than those made from k-carrageenan. Shah and Ravula (2000) reported that the survival of probiotic bacteria in fermented frozen desserts improved with encapsulation. Encapsulation thus may enhance the shelf-life of probiotic cultures in frozen dairy products.

A recent study has indicated that the survival of alginate immobilized bacteria may be dependent on the gel concentration and bead size (Lee and Heo, 2000). It may also be noted that L. acidophilus and B. bifidum have a different response to the gastro-intestinal conditions. Mituoka (1992) reported that L. acidophilus is most active in the small intestine and B. bifidum is most active in the large intestine of humans.

The growing realization by consumers that our food profoundly influences our health has fuelled the introduction of food products with health claims such as probiotics into the market. Research to support the claims must take into account the effects on and activity of our gastro-intestinal microbiota, of which there is an estimated 10 times more than our tissue cells. Novel molecular technologies are transforming our approaches for analysis of the complex intestinal ecosystem. Although, acknowledging the strides made in elucidating the activity of pathogenic microbes in disease, we can appreciate that an understanding of probiotic functionality in intestinal ecology will require continued concerted and interdisciplinary research efforts (Gibson et al., 2004).

Milk products such as ice cream and frozen desserts may serve as carriers for delivering the probiotic bacteria into the human gut. The high total probiotic bacteria in all types of ice
cream were between 108 and $10^9$ cfu/g at the end of three months of storage which is the normal shelf life of ice cream. This viable cell number is higher than that recommended by the International Dairy Federation ($10^7$ cfu/g), indicating that the high initial number of probiotic can provide the recommended number in the final product. Further studies are needed to evaluate the protection and effect of microencapsulation on the probiotic survival in the gastrointestinal tract, and also feature studies need to be carried out in order to monitor the effect of microencapsulation on bacteria in the gut, using animal models, as well as studying other parameters such as the initial cell numbers and bead size. Furthermore, the sensory evaluation of probiotic with microencapsulated probiotic bacteria (study in progress) will reveal the consumer response, to the texture and the changes in organoleptic characteristics of the probiotic ice cream (Jayamanne & Adams, 2006).

From the findings of the study undertaken, it can be concluded that Optimization of probiotic viability through the Encapsulation, Growth promoters and Cryoprotective agents with compatibility with ice creams.

It can be further concluded that, Probiotic ice cream $T_1$ (prepared from whole milk, 6.00% fat, 9.00% S.N.F., 15.0% sugar and 0.5% Emulsifier/stabilizer + probiotic culture without any effect) was found to be most acceptable in terms of flavour and taste and overall acceptability in comparison to other treatments.

In terms of viability of probiotic culture and exerting health benefits to the consumers $T_2$, $T_3$ and $T_4$, Probiotic ice cream (prepared from whole milk, 6.00% fat, 9.00% S.N.F., 15.0% sugar and 0.5% Emulsifier/stabilizer + probiotic culture encapsulation, Glycerol and ginger extract and honey) was found to be some extant acceptable in terms of flavour and taste and overall acceptability in comparison to other two i.e. $T_0$ and $T_1$ treatments, very particularly in terms of the viability the $T_2$ has give a consistent and high viability when compared to $T_3$ Cryoprotective agent glycerol and $T_4$ growth prompters ginger extract and honey.

After we observing the samples of probiotic ice cream $T_2$, $T_3$ and $T_4$ in detail the positive points for $T_2$ is as the probiotic bacteria is encapsulated with matrix the biological activity of the bacteria is put in to check then the lactose cant convert in to lactic acid, due to
which the titratable acidity cannot rise by which the product self life and its acceptability to consumers is enhanced.

The technology of micro encapsulation has developed from a simple immobilization or entrapment to sophisticated and precise micro capsule. The advances in this field have been tremendous with nutraceuticals and food ingredients;

However, as to the micro-encapsulation of live probiotic bacterial cells, the technology seems to be not well developed. Probiotic therapy (or microbial intervention) is for based on the concept of healthy gut micro flora. the delivery of viable micro encapsulated probiotic bacteria will become important in the near future. Microencapsulation will assume importance in delivering viable strains of probiotic bacteria in large numbers to consumers. It will be used as tools to co encapsulate both

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Mituoka (1992) reported that _L. acidophilus_ is most active in the small intestine and _B. bifidum_ is most active in the large intestine of humans. further studies need to be carried out in order to monitor the effect of microencapsulation on bacteria in the gut, using animal models, as well as studying other parameters such as the initial cell numbers and bead size. Furthermore, the sensory evaluation of probiotic with microencapsulated probiotic bacteria (study in progress) will reveal the consumer response, to the texture and the changes in organoleptic characteristics of the probiotic ice cream.