Evaluation of Survival Rate and Sensory Properties of Encapsulated Probiotic Bacteria in Quarg cheese

K. S. Kadiya[1] and S. K. Kanawjia[2]

[1]Department of Dairy Technology, SMC College of Dairy Science, AAU, Anand-388110
[2]Dairy Technology Division, NDRI, Karnal-132001
Email: kk.ndri2008@gmail.com

ABSTRACT

Objective

Use of microencapsulation technique as an aid to improve the survival of probiotics in the Quarg cheese during storage and during GI transit for beneficial health claims and its effect on sensory properties of Quarg cheese.

Methodology

Fresh, chilled, raw buffalo milk was used in this study. The probiotic strains *Lactobacillus casei* NCDC 298 and *Lactobacillus acidophilus* NCDC – 15 were used in this experiment. Quarg cheese was manufactured by using method described by Spasenija D. Milanovic *et al.* (2004) with some modifications. There were three forms of probiotic cultures, i.e. propagated (M1), cultivated cell biomass (M3) and micro encapsulated cells (M4) were used in this study and added at two different stages in Quarg cheese. The probiotic cells (NCDC 15 and NCDC 298) were microencapsulated in sodium alginate matrix as described by Sheu *et al.* (1993). The samples were examined for the probiotic counts and various sensory attributes during 28 days of storage period. The data was subjected to one-way / two-way analysis of variance (ANOVA) using the SYSTAT Software.

Result and Discussion

The survival rate and effect of free and calcium-induced alginate-starch encapsulated probiotic bacteria (*Lactobacillus acidophilus* NCDC 15 and *Lactobacillus casei* NCDC 298), on sensory attributes of quarg cheese were studied over 4 weeks storage. The results showed that there were significant difference ($p<0.05$) in free and encapsulated probiotic cells for both the probiotic bacteria after 28 days of storage. There was increased survival of 1.5 and 1 log cell numbers of both *Lactobacillus casei* NCDC 298 and Lactobacillus *acidophilus* NCDC 15, respectively due to protection of cells by microencapsulation. However, it was also observed that the survivability of NCDC 298 and NCDC 15 did not differ significantly between the experimental samples M2 and M3 up to 7 days of storage. Significant ($p<0.05$) increase was found after 14 days of storage. The high survivability of encapsulated probiotic cells 8.88 log in case of NCDC 298 compared to 8.14 log cells for NCDC 15 during 28 days of storage of Quarg cheese, indicates that *Lactobacillus casei* NCDC 298 can be effectively used as therapeutic dose in encapsulated form for the manufacture of probiotic Quarg cheese. The addition of probiotics either in free or encapsulated states significantly ($p<0.05$) affected various sensory attributes like flavor and taste, body and texture and color and appearance of the Quarg cheese over the storage period. There were, however, no significant differences in overall acceptability of Quarg cheese made by M3 and M4 methods whereas propagated probiotic culture (M2) added with traditional culture has remarkable effect on sensory attributes compared to control Quarg cheese.

Conclusion

This study showed that Quarg cheese incorporating probiotic cultures could be made without much modification from the traditional Quarg making technology. Sensory analysis of the Quarg cheese showed that addition of probiotic in free and capsules forms did not significantly alter the flavor and taste, body and texture and color and appearance of the Quarg cheese, however microencapsulation is required to enhance the survival of probiotic cells compared to free cells in Quarg cheese stored over 28 days.