SUMMARY AND CONCLUSIONS

VII. SUMMARY AND CONCLUSION

The present investigation was undertaken with the major objective of developing a cheese cake type dessert with soybean, by studying various processes and standardising various procedures for the conversion of soybean to soymuska, and inturn, soy-muska to cheese cake with added texture modifiers , flavour essence and colouring agents. The products thus standardised were characterised interms of recovery of solids during the various stages of converting soybean to cheese cake, gross composition of the final product and the microbial profile during the refrigerated storage up to 3 months period. This chapter summarises the important findings and conclusions derived from these studies.

* **Standardization of processes and procedures in the preparation of cheese cake**

Preparation of cheese cake involved the conversion of soybean to soymilk , soymilk to soycurd and subsequent conversion of soycurd to "soymuska", which was used as the basic cheese ingredient in the preparation of cheese cake.

Soymilk prepared by wet extraction method yielded soymilk with 7 - 9 % total solid concentration and found to result in curd firmness adequate for the preparation of muska.

Dahi samples, used as lactic culture obtained from five different commercial sources, did not show any significant difference in developing titratable acidity, pH and curd strength. Any of these "dahi" cultures could be used for obtaining soycurd from soymilk. However, the culture from source - II was used at 1% level for 14 hrs incubation.

Among the two incubation temperatures (i.e. 32 and 40^{o}C) , the temperature of 40^{o}C for the duration of 14 hours yielded curd with a somewhat higher Developed Titratable Acidity (D T A) and curd strength, in comparison to the lower incubation temperature of 32^{o}C.

Substitution of soymilk with 5% RSM was found to be inadequate as a source of lactose to produce desirable developed titratable acidity and reduction in pH in soycurd, as commonly obtained in case of curds set with dairy milk.

Fortification with lactose containing ingredients, such as whey, RSM, lactose powder, showed improvement in terms of

developed titratable acidity, pH reduction and curd strength in soycurds. However, little beneficial effect could be observed in case of sucrose,added alone. Combination of lactose containing ingredients with sucrose improved curd forming behaviour of soymilk.

Among different fermentable sugar ingredients used in combinations at different concentrations, sucrose with lactose (1g% each) or whey (10% v/v) with RSM (4% v/v) or RSM (4% v/v) with lactose (1g%), or RSM (4% v/v) with whey (10% v/v) resulted in soycurds having D T A of 0.5 - 0.7 % lactic acid with a pH ranging between 4 - 5 and with a curd strength of above 30 gms. Of these sucrose with lactose (1g% each) and whey (10% v/v) with RSM (1% v/v) were utilised in the product development studies.

Draining the curd for 6 hrs to remove the whey was found to be adequate for obtaining muska with the desirable moisture content for cheese cake.

Addition of 20 g% egg with sugarmuska mix yielded cheese cake with most acceptable textural and flavour characteristics. Lowering the concentration of egg below 20 g% resulted in cheese cake with weak textural properties along with the residual beany

flavour of soymuska. Cheese cakes prepared with more than 20 g% of egg, developed excessively firm body and textural characteristics and with an objectionable "egg-type" flavour.

Setting temperature of 70°C which yielded the gel strength of about 80-90 g was considered to be desirable. Setting temperature below 70°C (60 & 65°C) or above 70°C (75 & 80°C) caused unsatisfactory setting of cheese cake, resulting in undesirable textural characteristics.

* **Replacement of egg with other thickening agents**

Replacement of egg in soybased cheese cake was found to be necessary, mainly due to its cost and its limitation of being considered as a non-vegetarian ingredient by many in India. Among the thickening ingredients studied for the replacement of egg, rice, wheat and potato added in the form of cooked paste, yielded cheese cake with desirable textural characteristics. Pectin, gelatin, corn starch, bengalgram, blackgram, greengram used in the form of cooked paste developed objectionable off flavour and textural characteristics in cheese cakes.

Adding rice, wheat and potato paste at 20 g% levels to sugar-muska mix yielded most desirable textural properties. A

further increase in the proportion resulted in flavour defects, characteristic of the thickening ingredients added.

A setting temperature of 75^{o}C for 30 min was found to be appropriate for rice and potato based cheese cake. For wheat based cheese cake a setting temperature of 70^{o}C for 30 min was found to be desirable.

* **Addition of flavouring enhancers to soymilk**

The developed titratable acidity, changes in pH and curd strength of soycurd were not altered due to the addition of lemongrass and bayleaves upto the level of 0.4 g%.

Addition of these natural flavouring enhancers caused no significant improvement on the overall acceptability of cheese cake.

* **Addition of flavours, colours to the final product**

Among various flavours tried , viz. cardamom,and artificial flavours such as orange, pineapple, lemon, mango and vanilla essence, vanilla caused little improvement in overall acceptability of cheese cake. The natural flavouring agent, cardamom significantly improved the overall acceptability of the products.

Addition of flavour essence such as mango, orange and pineapple combined with orange and yellow colours showed significant improvement of product characteristics. The overall acceptability was raised from 3 (i.e. "liked") to above 4 (i.e. "liked very much" on the 5 point hedonic scale.

Treatment of soymilk with bayleaves and lemongrass combined with added flavours did not further improve the product characteristics.

* **Characterization of final products**

In the conversion of soybean to soymilk 68.47 % solids were recovered from soybean and in the preparation of soymuska only 11.8 % solids were lost in whey and the "soymuska" utilised in the preparation of cheese cake had retained 80.9 % total solids from soymilk.

Cheese cakes prepared with egg contained highest protein content of 6.75%, 1.5 % fat and had low carbohydrate content of 36.2% as compared rice,wheat and potato based cheese cake which contained 4.00 - 4.73% of protein , 0.75 - 0.9 % fat and 40.96 - 42.90 % carbohydrate. The moisture content was 55 % for egg based cheese cake and 51-52 % for the wheat, rice and potato containing products.

Soy based cheese cakes prepared with egg, rice, wheat & potato and flavoured with orange essence and stored at 4 - 10^{o}C remained unspoiled for the 90 days period of storage interms of sensory and microbiological characteristics studied .