Ghee, a form of clarified butterfat, is the most important dairy product in India. Its manufacture is the only economical alternative for the utilization of surplus milk, chiefly in rural sectors and milk pockets. A recent survey made by the Central Statistical Organization (Anon, 1961a) showed that of the total milk produced in the country, 45.23% was utilized as fluid milk, 31.85% for conversion into ghee, and the rest for conversion into dahi, butter, khoa, ice-cream, channa and cream. According to the tentative estimates of the Department of Marketing and Inspection of the Government of India, 446.7 thousand metric tonnes of ghee were produced in India in 1961 (Anon, 1961b). It is likely that production of ghee as at present might be still higher. Even if we assume status quo in regard to the production of ghee, the estimated price of total production of ghee in India per year at the prevailing price of rupees 20 per kg would amount to about rupees 900 crores.

It is obvious that ghee occupies an important place in the overall dairy economy of the country.

Chemically, ghee is a complex mixture of lipids such as glycerides (usually mixed triglycerides), free fatty acids, phospholipids, sterols, sterol esters, fat soluble vitamins, carbonyls, hydrocarbons, carotenoids (only in cow ghee), together with small amounts of charred
casein and traces of moisture (not more than 0.3%). Glycerides constitute about 98% of the total lipids.

Ghee making in India is mostly a home industry. Substantial amounts come from villages where it is usually prepared by the desi method. However, small amounts of ghee have also been prepared recently in the organized sector.

Ghee owes its importance, among edible fats, to its pleasing flavour whereas butter oil, the nearest European counterpart of ghee, has rather a bland flavour. Furthermore, the pleasing flavour of ghee is quite different from that of the milk, cream, dahi and butter from which ghee may be ultimately derived. The flavour of ghee is highly variable. The method used for the preparation of ghee plays an important part in determining the final flavour of the product. Of the methods used for the preparation of ghee namely, indigenous or desi-, creamery butter-, direct cream- and prestratification methods, the desi method generally produces ghee with the most desirable flavour. Temperature of clarification of cream or butter used in the preparation of ghee is also very critical in determining the ultimate flavour of ghee. Too high temperatures of clarification lead to 'cooked' or 'burnt' flavour in ghee, whereas lower temperatures of clarification yield ghee with milder flavours.
The composition of milkfat is so complex that it can generate multiple of flavour compounds, some of which may be desirable or undesirable depending upon the particular food product in which they occur. These flavour compounds may include volatile fatty acids, saturated and unsaturated aldehydes, ketones, sulphides, alcohols, lactones etc. Although a detailed profile of ghee is still unknown, recent work in this laboratory (Jain and Bindal, 1968; Jain and Singhal, 1969; and Jain et al., 1971) has shown that carbonyls play an important role in the flavour of ghee.

Ghee, like other oils and fats, is highly susceptible to development of off-flavour. This renders huge quantities of ghee unacceptable for consumption as a dietary fat in this subtropical country, and this loss is bound to affect the dairy economy of the country to a great extent. It was, therefore, of interest if this loss could be eliminated or at least minimised. For this, basic information about the nature of the desirable flavours and off-flavours of ghee is an obvious prerequisite. As already indicated, carbonyls have been shown to contribute significantly to the flavours of ghee.

The present study was undertaken to provide the above mentioned basic information, at least in part, by delineating the changes, qualitative and quantitative, which the carbonylic flavours of ghee undergo.