CHAPTER VI

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The effect of feeding cottonseed on the milk yield, its effect on the lactation period in early and late lactation animals has been studied. Variation in the chemical composition of ghee due to feeding of cottonseed was also emphasized. The body fats of pig, sheep, goat and buffalo which are usually used in the adulteration of ghee have also been studied for their physico-chemical properties. An effort has also been made to develop a test for the detection of adulteration of body fats in ghee. The data on such endeavour are detailed as follows:

1. The milk yield reduced significantly in early lactation animals and the effect was more in the case of cows than buffaloes. Similarly the lactation period of such animals was also reduced significantly and the cows were more affected than buffaloes. In late lactation animals, however, the lactation period as well as the milk yield was not affected significantly. In the light of these observations, it was suggestive that cottonseed feeding should not be encouraged to animals to increase milk yield.

2. Feeding of cottonseed increased significantly fat and SNF of milk in the case of early as well as late lactation cows and buffaloes. Such effect was carried over even after the withdrawal of cottonseed feeding till the end of lactation period.
3. The feeding of cottonseed to cows and buffaloes affected the analytical constants of ghee which are as follows:

(a) There was an increase in Butyrosrefractometer reading in both the species.

(b) The Reichert Meissl value decreased significantly in both the species.

(c) The Polenske value also decreased significantly in both the species.

(d) The saponification value decreased significantly in both the species.

(e) The Iodine value increased in both the species significantly.

4. Feeding of cottonseed significantly increased the unsaponifiable matter of ghee obtained from the milk of cows and buffaloes.

5. The level of free cholesterol in ghee was more than bound cholesterol in both the species. Feeding of cottonseed significantly increased the levels of free as well as bound cholesterol in the case of cow ghee while there was a significant decrease in the levels of the same (free and bound cholesterol) in buffaloes.

6. Feeding of cottonseed had a significant effect on the level of the phospholipid content of ghee in both the species. Among the four body fat was
samples analysed it was observed that sheep body fat was richest while buffalo body fat was poorest in the phospholipid content. Cottonseed oil was found to be richest in phospholipid content as compared to ghee or body fat samples.

7. The opacity of ghee samples increased as the level of cottonseed feeding was increased in both the species.

8. Storage of cow and buffalo ghee samples at room temperature upto 180 days did not show any change in the Reichert Weissl, Polenske, Saponification, Iodine values and Butyrorefractometer readings. There was however an increase in acid value and peroxide value and the effect was more in buffalo ghee than in cow ghee.

9. The ultraviolet spectrum of ghee showed two peaks at 230 nm and 260 nm in both the species and as the level of cottonseed feeding increased there was also a concomitant increase in the optical density indicating thereby an increase in the concentration of linoleic and linolenic acids.

The ultraviolet spectrum of the unsaponifiable matter obtained from the above ghee samples also showed two peaks in the same region as in ghee samples in both the species. An increase in the optical density with the level of cottonseed feeding indicates an increase in linoleic and linolenic acids.
All the body fats (pig, sheep, goat and buffalo) showed only one maxima as compared to two maxima as in the case of ghee samples.

The cottonseed oil and its unsaponifiable matter also showed two peaks as in the case of ghee and body fats.

10. The paper chromatographic studies of the ghee samples showed that as the level of cottonseed feeding was increased, the ghee samples showed a tendency to stay at the place of origin in both the species. In the case of body fats, it was observed that sheep, goat and buffalo body fats stay at the place of origin while pig body fat showed a tendency to migrate with the solvent front.

The unsaponifiable matter obtained from ghee and body fat samples also showed a similar paper chromatographic pattern as in the case of whole fats.

11. The thin layer chromatographic pattern did not show any difference in the number of spots of cow and buffalo ghee samples. Such number of spots was not changed due to cottonseed feeding in both the species. The concentration of long chain triglycerides was more in the case of cow ghee samples as compared to buffalo ghee samples. Further, there was an increase in the case of cow ghee and a decrease in the case of buffalo ghee samples in the intensity of long chain triglycerides with the level
of increase in the cottonseed feeding. In the case of body fat samples there was absence of short chain triglycerides spot which was also evident from the fact that the gas liquid chromatography showed the absence of short chain triglycerides in all body fats. The number of spots on the thin layer chromatogram was same in all the body fats indicating thereby the similarity of all body fats towards such chromatographic analysis.

The thin layer chromatographic pattern of the unsaponifiable matter showed the identity of cow and buffalo ghee samples with the body fats and also that cottonseed feeding had no effect on the unsaponifiable matter of ghee samples.

12. The gas liquid chromatographic pattern of cow and buffalo ghee showed a great similarity in the species except with same minor difference like the higher concentration of butyric acid in buffalo. The feeding of cottonseed increased the concentration of C16' fatty acid in the case of cow ghee while there was a decrease of the same in the case of buffalo ghee.

Body fats of sheep, goat and buffalo had a great similarity among themselves except for pig body fat which resembled ghee in its fatty acid composition. The fatty acid ratio C14/C16 had lower value in body fats as compared to ghee and among the body
fats, the pig body fat had the lowest value. In the case of C18/C18 fatty acid ratio, the value was less than 1.0 in ghee and pig body fat, whereas it was more than 1.0 in the case of body fats of sheep, goat and buffalo.

13. Cottonseed feeding did not introduce or reduce any carbonylic flavour component in the ghee samples of cow and buffalo as was evident from the thin layer chromatographic pattern of its DMP hydrazones prepared from steam distillates. The flavour components of sheep, goat and buffalo body fats were found to be the same but in pig body fat there were 5 more components with the absence of one as in the case of other body fats.

14. In the study of the lipolytic rate, it was observed that pig body fat and cow ghee had similar trend while other body fats (sheep, goat and buffalo) and buffalo ghee had similar trend.

15. The fatty acid ratios of C14/C16 and C18/C18 can be used as a tool for the detection of adulteration of ghee with body fats up to a limit of 10-15 percent. Paper chromatography can also be used for such detection with the limitation of pig body fat. The level of detection possible by using paper chromatography was 5-10 percent only.