

Detection of Lard Adulteration in Cow and Buffalo Ghee by Triglyceride Profiling using ISO 17678:2010 Method

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Abstract—India is the world's largest producer of milk and consequently also the largest producer and consumer of ghee having a 27.5% share in milk utilization pattern (Global Agriculture Information Network, 2014). Ghee is one of the costliest edible fats and hence adulterated using cheaper animal body fats like lard and vegetable oils by unscrupulous middlemen. ISO and IDF have jointly recommended a gas chromatographic method (ISO 17678:2010) specifying S- limits for pure cow milk fat to check its purity using triglycerides. In the present investigation pure cow and buffalo ghee samples were adulterated with lard @ 5%, 10% and 15%. Data showed that pure cow and buffalo ghee predominantly comprised both medium and higher chain triglycerides in combination with low levels of small chain triglycerides. Lard consisted of higher chain triglycerides mainly C50, C52 and C54. The adulteration of cow and buffalo ghee with lard lead to a corresponding increase in the content of triglyceride with carbon number 50, 52 and 54 i.e. C50, C52 and C54. On account of the S- limits as specified by ISO for cow milk fat deemed to be qualified as pure, showed deviations in the adulterated samples. S-total value decreased from 102.76 ± 0.02 in control cow ghee to 94.84 ± 0.06 , 90.14 ± 0.05 , 86.55 ± 0.03 whereas S-limit i.e. S5 (Lard equation) increased from 100.01 ± 0.01 in control ghee to 104.66 ± 0.05 , 109.10 ± 0.03 and 111.96 ± 0.06 in cow ghee adulterated with lard at 5%, 10% and 15% level respectively. This clearly showed that in case of cow ghee, addition of 5% lard could be detected. ISO has not specified any S- limits for buffalo milk fat and results in the present investigation also showed variation in the triglyceride profile of pure buffalo ghee from cow ghee, so S- limits specified for cow milk fat cannot be considered as such. However, a trend akin to adulterated cow ghee was observed, wherein, S-total value decreased from 112.03 ± 0.06 in control buffalo ghee to 108.69 ± 0.04 , 101.14 ± 0.07 , 95.54 ± 0.08 and S5 (Lard equation) increased from 97.75 ± 0.03 in control buffalo ghee to 99.83 ± 0.02 , 104.23 ± 0.09 and 109.39 ± 0.05 in buffalo ghee adulterated with lard at 5%, 10% and 15% level, respectively. Unpublished data from another investigation in the same laboratory has observed that in buffalo ghee the S- total ranged (94.81 - 112.19) and S5 (96.37 - 102.07). On account of the S- limits for buffalo ghee as mentioned above, S- total could not detect even 15% level of adulteration in buffalo ghee, However, S5 (lard equation) could detect 10% level of lard addition. Hence, it can be concluded that it is possible to detect minimum 5% added lard in cow ghee and 10% in buffalo ghee.

Keywords: Ghee, triglyceride, lard, adulteration.