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## ADULTERATION OF GHEE AND ITS IMPACT ON HUMAN HEALTH

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**D**ietary maintenance and survival depend heavily on food, whether it comes from plants or animals. Eating wholesome, safe food is essential for maintaining excellent health. Adulteration is the addition of undesired ingredients or mixes that the consumer is unaware of while making a purchase. Food is being tampered with in order to increase its shelf life or to make unlawful profits. Nearly every food we eat—from fruits to jams, from vegetables to vegetable oils, from milk to milk products, etc.—that we purchase from markets contains some level of adulteration. Eating foods of this type leads to serious health issues. Thus, we ought to purchase these goods from only authorized vendors after doing a thorough inspection ourselves. We have a plethora of techniques at our disposal for figuring out whether products—especially dairy products like ghee—are adulterated.

A common component in Indian cooking, ghee, often called clarified butter, is symbolic of a family's success and fortune. Nonetheless, there have been multiple instances of ghee adulteration. The reason why rancid ghee, also called vanaspati, is sometimes sold under the ghee moniker is due to their similar color and texture. Ghee is a key component of Ayurvedic treatments, according to Ayurveda, since it promotes health and aids in growth. In addition, it provides nourishment and detoxifies the entire body. The cost of edible vegetable oils and fats is nearly three times less than the market price of ghee. Ghee is also significantly less available than is needed. These discrepancies in cost and accessibility give rise to various malpractices. In India, adulterating ghee is a more prevalent malpractice due to the fact that it increases supply, yields higher profits for the dealers, and can begin at the milk stage (Nurseitova *et al.*, 2021).

## Common Adulterants in Ghee and Their Rapid Detection Methods

Fat-soluble vitamins, such as A, D, E, and K, which our bodies cannot produce on their own but require in very little amounts, are carried by cow ghee. Numerous vital tasks are carried out by these vitamins. Another significant dairy product that is traded across state lines is ghee. Both the price and the demand for ghee are extremely high. Thus, in order to make large profits, ghee is being tampered with. Due to fluctuations in composition across different regions and seasons, as well as the influence of animal type and diet, determining its purity frequently necessitates extensive investigation and quality testing (Kumar et al., 2002). Typical adulterants found in ghee include vegetable and other oils, Vanaspati, coal tar colors, and potato and other starches.

### 1. Detection of Starches (Potato, Sweet Potato, Other Starches)

Iodine tincture is used in this procedure. Add two to three drops of iodine tincture to half a spoonful of ghee; if the ghee contains starch, the mixture will become blue.

### 2. Detection of Palm Oil in Ghee

Two ml of ghee is taken and added to 1 ml of ferric chloride and 0.3 ml of potassium fericyanide. The color of pure ghee is green, and for adulterated ghee, the color changes to blue.

### 3. Detection of Coal Tar Dyes

Add five ml of dilute sulfuric acid to one tea spoon full of melted ghee. The pink color indicates the presence of coal tar dyes.

### 4. Detection of Vanaspathi or Margarine in Ghee

Take a tea spoon full of melted ghee in a test tube, add an equal quantity of conc. sulfuric acid, and add a little amount of sugar. Shake for a minute and leave aside for 5 minutes. If the color changes to crimson, it is due to the presence of vanaspathi or margarine.

### 5. Detection of Vegetable Oils

One tea spoon of melted ghee is taken, and sugar is added to it. After that, shake it by closing the container. If the color turns red, it indicates the presence of vegetable oils.

## 6. Adulteration with Animal Body Fat

Compared to vegetable oil and fats, adulteration of ghee with animal fat is less widespread. Different amounts of tallow or other animal body fats from slaughterhouses are combined with ghee. Since animal fat is hard, it cannot be seen with the naked eye. It is challenging to detect ghee that has been tainted with animal fat since its chemical properties are within the typical range of pure ghee. It has been discovered that ghee made from buffalo-fed cotton seeds has analytical constants that are comparable to samples tainted with animal fat.

### A Novel Approach for The Detection of Adulterated Ghee with Vegetable Oil Recommended By FSSAI

A novel technique for identifying adulteration in ghee (clarified milk fat) with vegetable oils has been announced by the Food Safety and Standards Authority of India (FSSAI), which is the highest food regulatory body in the nation. After careful consideration, the scientific committee, the scientific panel on sampling and analytical techniques, and the food authority as a whole accepted this method. Since the technique relies on the identification of cholesterol and  $\beta$ -sitosterol as indicators in the unsaponifiable matter (USM) of samples of genuine ghee and adulterated ghee, it is far more straightforward and simple to use. The presence of  $\beta$ -sitosterol indicates that vegetable fats have been added to ghee. The labs used conventional procedures, including the Furfural and Baudouin tests, to guarantee the purity of the ghee. The furfural test identifies ghee that has been tampered with with sesame oil, whereas the Baudouin test finds that ghee contains hydrogenated fat, refined vegetable oil, vanaspati, and animal fats (FSSAI, 2019). The FSSAI states that this handbook will serve as a reference for putting innovative techniques for spotting adulterated vegetable oil into practice. All testing facilities must use this procedure, which ensures consistency in the findings.

### Conclusion

Food adulteration, especially with regard to ghee, has become a major issue in recent times, affecting even baby food. Eighty percent of premature deaths are attributed to tainted food and water, according to a report. Governments ought to prosecute those who engage in this barbaric behavior harshly. The public needs to be informed about adulteration because there is a possibility for those who perpetrate it to go unnoticed. Eat well to live a long life.

## References

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