PANEER ADULTERATION IN INDIA: A GROWING PUBLIC HEALTH CONCERN

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ABSTRACT

Paneer, a widely consumed dairy product in India, accounts for about 5% of the nation's milk usage and is valued for its high protein and calcium content. However, increasing demand has led to rising cases of adulteration with harmful substances such as starch, detergents, palm oil, and synthetic milk. Additionally, "analogue paneer," made from non-dairy ingredients like vegetable oils and starch, is being produced and sold without proper labeling, violating Food Safety and Standards Authority of India (FSSAI) regulations. Recent investigations across cities like Noida, Ludhiana, and Rajkot revealed alarming levels of contamination. Adulterated paneer can cause serious health issues including malnutrition, cardiovascular diseases, and digestive problems. While FSSAI mandates clear labeling and compositional standards, enforcement remains a challenge. Consumer awareness, stricter regulation, and improved surveillance are essential to combat this public health risk. Promoting ethical dairy practices and empowering consumers can help ensure paneer safety and nutritional integrity.

KEYWORDS: Paneer, adulteration, analogue paneer, food safety, dairy products, consumer awareness

INTRODUCTION

India is the world's largest milk producer, with an estimated output of 239.3 million tonnes in 2023–24. Approximately 60% of this milk is consumed in liquid form, while the rest is processed into dairy products such as ghee, butter, curd, cheese, ice cream, and paneer. Paneer, or Indian cottage cheese, is a fresh, non-fermented cheese obtained by heat and acid coagulation of milk and is a vital component of vegetarian diets.

Paneer constitutes around 5% of total milk utilization in India, with its production growing at an annual rate of 13%. According to the Food Safety and Standards (Food Products Standards and Food Additives) Regulations, 2011, paneer must not contain more than 70% moisture and must have at least 50% milk fat on a dry matter basis. The Bureau of Indian Standards prescribes even stricter moisture limits (maximum 60%) for paneer.

Paneer is highly valued for its nutritional profile, providing high-quality protein, calcium, and fats. It contributes to energy metabolism, immunity, and growth, particularly in children. However, due to rising demand and economic incentives, unethical practices such as the adulteration of paneer with starch, synthetic milk, palm oil, and harmful chemicals have become prevalent, producing substandard or fake paneer.

SOME RECENT INCIDENTS OF PANEER ADULTERATION ACROSS INDIA

Several recent investigations have revealed the growing prevalence of paneer adulteration:

- **Ludhiana:** 16 of 29 Paneer samples tested were found unsafe for consumption.
- **Noida & Greater Noida:** An FSSAI survey (April 2025) showed 83% of paneer samples failed quality checks, 40% were unsafe.
- **Ahmedabad:** FDA seized 1,500 kg of adulterated paneer containing palm oil and acetic acid.
- **Jaipur:** During Holi, 21 paneer samples failed quality checks due to inadequate fat content.
- **Rajkot:** 800 kg of synthetic paneer made with palm oil and milk powder was seized.
- **Patiala (Nabha):** Authorities seized 1,300 kg of counterfeit paneer in May 2025.

Table 1: Differences Between Real Paneer and Analogue Paneer

Criteria	**Real (Traditional) Paneer**	**Analogue Paneer**
Composition	Made from fresh milk curdled with natural acids like lemon juice or vinegar	Composed of vegetable oils (e.g., palm oil), starches, emulsifiers, and additives
Nutritional Value	High in protein, calcium, and healthy fats	Lower protein content; may contain trans fats or excessive saturated fats
Texture	Soft and slightly crumbly due to milk protein coagulation	Rubbery or overly smooth, influenced by starches and stabilizers
Color	Off-white with slight natural variation	Bright white and uniformly colored due to refined oils and additives
Cooking Behavior	Retains shape; browns slightly, enhancing taste and texture	May melt, turn rubbery, or disintegrate when heated
Aroma and Taste	Mild milky aroma with a creamy, natural flavor	Lacks dairy aroma; may have synthetic or chemical-like taste
Regulatory Labeling	Naturally dairy, requires no special labeling	Must be labeled as “analogue” or “non-dairy” as per FSSAI regulations

According to FSSAI, "analogue" products contain non-dairy constituents replacing milk components and must be clearly labelled.

Table 2: Common adulterants in Paneer and their uses

Adulterant	**Purpose**
Starch	Bulk + texture enhancement
Detergent	Foaming/emulsification
Synthetic milk	Cost-cutting base for base
Palm oil	Milk fat substitute
Urea	Artificial protein enhancement
Caustic soda	Preservative in synthetic milk
Chalk powder	Whitening agent
Excess water	Increases yield
Formalin	Preservation, shelf-life extension

DETECTION METHODS

Several simple tests can help to detect adulterated paneer:

1. **Iodine Test:** Blue color develops after adding iodine to boiled and cooled paneer which indicates starch.
2. **Tur Dal Test:** A red tint will be developed after adding tur dal powder suggests detergent or urea in it.
3. **Soybean Test:** Red hue develops after adding soybean powder to boiled paneer indicates harmful chemicals.

4. **Heat Test:** Real paneer when heated, it browns or crumbles; whereas fake paneer may melt or become rubbery.
5. **Texture Test:** Real paneer feels soft and crumbly; on other hand analogue paneer is rubbery or overly smooth.
6. **Label Check:** Authentic packaged paneer should declare its dairy/non-dairy status on its labeling as per the FSSAI labelling regulations.
7. **Sensory Check:** Real paneer has a fresh milky aroma; adulterated versions may smell synthetic.

HEALTH IMPLICATIONS OF ADULTERATED PANEER

- **Nutritional Deficiency:** Lack of essential nutrients like protein and calcium.
- **Cardiovascular Risks:** Trans fats increase cholesterol, contributing to heart disease.
- **Gastrointestinal Issues:** Adulterants may cause bloating, nausea, or diarrhea.
- **Chronic Diseases:** Long-term consumption may raise risks of cancer, diabetes, and metabolic disorders.

REGULATORY FRAMEWORK AND ENFORCEMENT CHALLENGES

FSSAI regulates milk and milk products under the Food Safety and Standards Act, 2006. It mandates proper labeling and prohibits the sale of misbranded or unsafe food. Analogue products must be labeled as such, and non-dairy paneer must not be sold as "paneer" without disclosure.

Despite regulations, enforcement remains weak due to:

- Inadequate testing infrastructure
- Shortage of trained personnel
- Poor consumer awareness
- Widespread informal markets selling loose/unpackaged products

Certifications like ISI, AGMARK, or the FSSAI logo help consumers identify quality products.

CONCLUSION

Paneer adulteration poses a serious threat to food safety and public health in India. The unchecked production and sale of analogue paneer highlight the need for stringent regulation, robust enforcement, and public awareness. Authorities must increase surveillance and penalize violators. Simultaneously, consumers should be educated to detect adulteration and insist on quality certifications. A collaborative approach involving regulators, industry stakeholders, and consumers is essential to ensure food integrity and safety.

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