Vivekananda College

Project Title: Assessing and Improving the Quality of Fat used in College Canteens

Project Code: VC 101

1. Objectives

- Analyze fat samples for their quality attributes such as iodine value, acid value, refractive index, saponification value, solid fat index, Reichert-Meissl Value, melting point, nutritional components, adulterants, smoking/flash/ fire point, adulteration, colour and flavor.
- Assess the quality of fat by comparing with standards.
- Identify factors contributing to deterioration of fat/maintenance of good quality.
- Develop need-based Information Education and Communication material
- Improve awareness status of canteen owners and workers with regards to use and maintenance of fat quality.

2. Final Findings

A total number of forty college canteens were taken for the study on the basis of inclusion exclusion criteria. Fresh fat (group A), used fat (group B), fried food (group C) and non-fried food (group D) samples were collected in duplicate from each of the canteen. The samples were evaluated for 24 quality parameters (iodine value, acid value, refractive index, saponification value, solid fat index, Reichert-Meissl Value, melting point, nutritional components, adulterants, smoking/flash/ fire point, adulteration, colour and flavor) in order to assess their quality in terms of nutrition as well as safety. Presence of carbon was observed on tawa, karahi and oil in 67.5% (27), 72.5% (29) and 51.3% (20) canteens. Risk factors which hasten auto-oxidation (rancidity) in fat such as transparent containers (25%; 10) rust in containers (15%; 06), leakage in containers (5%; 02) and containers without lid (27.5; 11) were observed in several canteens. Smoke on the upper surface of fat and foam was observed during the frying process in 65% (26) and 47.5% (19) cases.

Analysis of fat and fat present in food samples further authenticated the deleterious effects of misuse of fat. The acid value of 40% (16), 90% (36), 80% (32) and 42.5% (17) of group A, B, C and D respectively was above the specifications; acid value of used oil being more than 400% above specified standards. 2.5% (1), 100% (40), 97.5 (39) and 92.5% (37) samples of group A, B, C and D respectively did not meet specifications. The mean smoke point of used fat ($191.75^0C \pm 30.96^0C$) was significantly ($p=0.000$) lower than that of fresh fat ($266.66^0C \pm 50.37^0C$). Similarly the mean flash point of used fat ($178.50^0C \pm 91.89^0C$) was significantly ($p=0.000$) lower than that of fresh fat ($350.00^0C \pm 0.00^0C$). The results indicate the presence of harmful compounds formed during repeated prolonged heating of fat.

Samples were also analyzed for their nutritive value. The fatty acid composition indicated presence of trans fats in 45% (18), 50% (20), 37.5% (15) and 52.5% (21) group A, B, C and D samples. The mean trans fat content was 9.45±1.69%, 11.46±2.38%, 3.26±1.77% and 3.10±1.28% of the total MUFA present in samples of group A, B, C and D respectively. The saturated, mono-unsaturated and poly-unsaturated fatty acid composition indicated the fats were lower in PUFA's and MUFA's (separately) as compared to SFA's; the mean SFA content being 34.7±21.89%, 33.74±17.25%, 20.39±10.99 and 15.41±7.54% of total fat in samples of group A, B, C and D respectively.

To create awareness among canteen contractors, workers and general masses, need based interventions in the form of play, brochure, poster, workshop, interactions with canteen operators and information handouts to principals of various colleges were made.

3. Learning for Students

The student participants have received the following benefits:

- Our under-graduate students received basic understanding regarding the fundamentals of research. They learnt the correct method of reviewing scientific literature (through visits to various libraries and web search; e-library), development/pretesting of tools/techniques, data collection and its analysis.

- Classes on use/application of programmes such as Excel, Power Point and web media helped them immensely.
- B.A program and Hindi Hon. Students received exposure to state-of-the art technology available in India for assessing quality of fat in food due to the collaboration of our college with FICCI-FRAC (Food Analysis and Research Center).
- During the development of Innovative "Fat Testing Kit" our Food Technology project students understood the importance of commitment, hard work and failures for achieving success.
- The students prepared a play to impart messages related to food safety. The play "Quality of Fat used in College Canteens" was enacted during the World Food Day celebrations at a workshop "Agricultural Co-operatives – Key to Feeding the World" organized by National Co-operative Union of India and Association of Food Scientists and Technologists (Oct. 2012).
- During Antardhwani, our students learnt about the work being carried out by their peers in other colleges which immensely enhanced their knowledge.
- The project facilitated participation of students in various scientific events such as:
    - Symposia 'Newer Health and Nutrition Challenges' organized by Nutrition Foundation of India, New Delhi (Nov, 2012).
    - International Conference 'Food Processing Value Chain Management and Food Safety (IFpvs), National Institute of Food Technology Entrepreneurship and Management (NIFTEM), MOFPI (Jan, 2013).
- Team approach and leadership qualities kindled in them.
- Students have gained skills and competency necessary for organizing scientific events such as the innovation project workshop and seminar held in March and July 2013 respectively.
- They learnt to work with their peers having diverse experience and subject knowledge.
- Enhanced interest, confidence and vision related to academic achievements and pursuit was observed in all student team members.

4. Benefits to College

- The purchase of necessary equipment for the analysis food/fat samples during the project has been able to improve the overall facilities of the Food Technology laboratory. We are hopeful of using the equipment for further academic purposes.
- Consistent networking with experts from other organizations has helped to enhance the profile of our college.

5. Benefits to Society:

During the project, need based Information Education and Communication material was developed and peer reviewed. It was used for enhancing awareness among college canteen contractors, canteen workers, students, teachers, administrative staff as well as general public

(such as that during world food day celebrations, Oct 2012). The recipients of this information shall acts as channels of communication for transmitting information related to good manufacturing practices (GMP). Such knowledge may bring changes in the attitude and practices of food handlers and food business operators. If such interventions are carried out at a large scale country wide, they can help to improve the quality of food provided by food service institutions and promote the sale of safe healthy food. It would thus help to reduce the existing rate of morbidity and mortality occurring due to the consumption of unsafe food having poor nutritional value.

6. Further Plans

- Organize training programmes for all canteen operators associated with academic institutions especially University of Delhi. Such training programmes would be accompanied by problem solving sessions so as to ensure better adherence of canteen operators to messages related to GMP (Good Manufacturing Practices).
- Develop need specific Hazard Analysis Critical Control Point (HACCP) plan for each canteen and each dish/product prepared and sold by them. Help the canteen operators develop their own HACCP plan for the future.
- Develop guidelines for infrastructure of college canteens, purchase of ingredients/utensils/equipment, pre-preparation, preparation, sale of food as well as mandatory work conditions for the canteen workers.
- Assess the quality of fat in street foods, restaurants, hotels and other food service institutions.

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