

Contribution of Milk Fat in Consumer Acceptance for Dairy Products

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Abstract—Consumers have increasingly recognized the link between health and diet. Recent medical research has found positive correlations between milk consumption and the reduction of risks for coronary heart disease and stroke. In the past three decades, there has been a clear shift in demand from whole milk toward reduced fat milk products. Studies have suggested that consumers notice full-fat milks as a higher in a range of positive nutritional qualities, such as protein, calcium and vitamin content but now trend is changing. Fat modify the taste and flavour of other compounds of foods Physical state of food affects taste compounds movement and odor receptors. Generally, the most palatable foods are those that are both energy-dense and high in fat content. The taste, smell, mouth feel, and hedonic properties of fat all contribute to the popular concept of fat “taste”. In that initiative, rural milk shed areas were linked to urban markets through the development of a network of village cooperatives for procuring and marketing milk. However, that growth has slumped to less than 3 percent in recent years, raising cause for concern. And because of the huge volume required, it will affect global milk prices. Thus, focusing on areas for local dairy development is critical. With the intention of reducing fat in food, it is important to evaluate its effect on sensory properties. The food industry is facing a challenge to produce fat-reduced products with comparable characteristics to the full-fat counterparts. In the absence of sufficient increased production, India will need to rely on the world market for imports.

Keywords:—Heart disease, Fat-reduced products, Hedonic properties, Dairy development.

1. INTRODUCTION

In Human diet fat plays an important role that contributes to the texture, flavor, and aroma variety of milk products in addition to being the most concentrated source of dietary energy. In general energy-dense and high fat content foods are the most palatable. Energy density of foods is largely determined by their water and fat content (Drewnowski, 1998). Even though, water does not provide macronutrient but has more impact on energy density. In the food supply, water and fat together, account for about 95% of the variance in the energy density of foods. Energy-dense foods that are rich in fat are more palatable as compared to low-energy-density

vegetables and fruit. In preference to plant-based diets pulses, grains, and legumes are consumed less than Energy-dense high-fat. The physiological consequence of ingestion such as satiety and wellbeing associates with sensory attributes which is based on method of learning of food preferences. The liking for fats can be influenced by Genetic predisposition, metabolic needs, and behavioral or emotional factors. Human preferences for fat-rich foods may also be influenced by economic factors and sociocultural values. Along with the evolving medical research finding and media exposure have been shifted by consumer’s attitude and perceptions of dairy foods. Link between fat consumption and chronic conditions such as heart disease and obesity have induced the health authorities in most of the western nations to recommend reductions in the consumption of total fats and certain saturated fatty acids in dairy products. The dairy industry has also been adjusting their product lines to adapt to changing consumer preferences. In the past three decades, there has been a clear shift in demand from whole milk toward reduced fat milk products. Consequently, Including functional dairy products have become the drivers of growth in the dairy sector, since today’s consumers are focusing more on nutritional content and health benefits, dairy products become them priority.

2. CURRENT SCENARIO OF MILK PRODUCTION

Milk and milk products have an important place in human diet for overall development and well being of the people. In India, milk is perceived to be associated with good health and wellness; as a result, it presents a major part of Indian diet. Apart from direct consumption, milk is also used in the preparation of various other products like tea, coffee, yoghurt, curd, paneer, cheese, butter, ice-cream, ghee, etc. At present, India ranks first in the world milk production. Dairy sector in India has acquired substantial growth momentum from 9th plan onwards. Achieving an annual output of about 133 million tonnes of milk during 2012-13. Several measures have been initiated by the Government to increase the productivity of

milch animals, which has resulted in increasing the milk production significantly from the level of 102.6 million tonnes at the end of the Tenth Plan (2006- 07) to 127.9 million tonnes at the end of the Eleventh Plan (2011-12).

3. ACCEPTANCE BY CONSUMER

Consumer acceptance is directly linked to satisfaction, nutritional content and health benefits, product quality, price, as well as consumer's socio-demographics and their acceptance of nutrition Dairy foods. Consumer beliefs towards relationship towards relationship a significant role

1. The Consumer acceptance affecting factors

Followed by the integration of sensory signals by the brain, sensory perception of foods involves the initial stage of chemo sensation, which includes the detection of tastings, odorants, and textural attributes of foods. Placement of food in the mouth begins sensory processes, the fracturing of the food by the teeth and its dilution with saliva, oral perception of temperature and texture, and the binding of taste and flavor molecules to receptors in the oral and nasal cavities, sends a signal through the sensory nerves to the brain. Activated receptors act on secondary messengers or other systems. Due to integration of sensory input, we become aware of the taste, aroma, and texture of foods (Chandrasekhar *et al.*, 2006). Palatability or the "pleasantness" of food is an integral part of a complete sensory profile for a given food (Yeomans. 1998) as the hedonic component of sensation. Variety of sensory mechanisms perceives fats. The concept of milk product food "taste" as understood by consumers includes the chemical sense of taste (gustation) the perception of food texture in the mouth and smell/aroma (olfaction). The first sensory response tends to be the olfactory perception through the nose or mouth of fat-soluble volatile flavor molecules. Texture is defined as the overall measure of oral sensations linked with placing food in the mouth adds to the sensation of fatty taste (Drewnowski *et al.*, 1989). The solid or liquid form that fat takes at different temperatures can also influence mouth feel and contribute to rejoice of high-fat foods. Consumer acceptance of Food convenience and availability in market determine the psychobiological factors such as fat content, palatability, satiety, and energy density, flavor and health risk.

3.1 Belief about fat in food

Consumers concerns about obesity, diseases, and fat changes the demand for fat in food. Today's consumers focus more on nutritional content and health benefits, including functional dairy products, have become the drivers of growth in the dairy sector. Therefore, the food industry is dealing with a challenge to produce fat-reduced products with comparable characteristics of the full-fat counterparts. With the intention of reducing fat in food, it is vital to evaluate its effects on sensory properties. Consumers have increasingly recognized the association between health and diet. Studies have suggested that consumers notice full-fat milks as a higher in a

range of positive nutritional qualities, such as protein, calcium and vitamin content but now trend is changing towards Low fat dairy products.

3.2 Fat as Flavour precursors

Flavour compounds of milk lipids produce by hydrolysis ,decarboxylation ,dehydration autoxidation ,oxidative autoxidation of USFAS of triglycerides, phospholipids and cholesterol esters results in aldehydes, ketone and alcohols. The main compound present in dairy product is Methylketenes. For example- 90% alkan-2-ones are present in ghee and give flavour. Lactones are produced during heat treatments from the thermal breakdown of γ - and δ - hydroxyacids (Forss., 1972). The following lactones have been recognized in milk such as δ -deca lactones, γ -dodeca lactones, 5-methyl-2 (5H) furanone, 2-butenoic, and acid- γ -lactone (Moio *et al.*, 1993). Ghee contains a mixture of 44 lactones, N-saturated delta & gamma lactones. Level of ghee is 30 ppm in unsaturated lactones and Gross lactones. Non Oxidative flavours compounds are formed by Hydrolysis of the glycerol ester bond form fatty acids glycerides, ketogenic-glycerides and lactogenic-glycerides act as flavour precursor of Fatty Acids, methyl-ketones, and lactones respectively.

3.3 Fat and Flavour perception

Fat modify the taste and flavour of other compounds of foods Physical state of food affects taste compounds movement and odour receptors. odor and flavor potentials are more in lipophobic than in oily medium. SCFA have higher FTV in aqueous medium low in oil.

4. SIGNIFICANCE OF MILK LIPIDS IN CONSUMER ACCEPTANCE FOR DIFFERENT DAIRY PRODUCTS

Fat plays a vital role in the human diet. In addition to being the most concentrated source of dietary energy. Fat contributes to the flavor, texture, and aroma of a wide variety of milk products generally, the most palatable foods are those that are both energy-dense and high in fat content. The taste, smell, mouth feel, and hedonic properties of fat all contribute to the popular concept of fat "taste".

5. MILK AND MILK PRODUCTS

Butter

Butter, fat rich dairy product, generally made from cream by churning and working. It contains 80% crystallized fat. Butter making is one of the oldest forms of preserving the fat component of milk. Butter is principally composed of milk fat, moisture, salt and curd. It also contains small amount of lactose, acids, phospholipids, air, microorganisms, enzymes and vitamins. Butter at sufficient concentrations to contribute sensorily. Urbach found that decanoic acid, o-octanolide, O-decanolide, p-cresol, insoleand skatole are present in sweet

cream. Whereas, the concentrations of octanoic and dodecanoic acids, γ - and O-dodecanolides, phenol, m-cresol and guaiacol are very less. VFFAs, methyl ketones (C_3 - C_{15}) 90% and Lactones z -4-heptenal, z -2-nonenal, E-2nonenal and 1-octane-2 one makes the flavour of butter. The concentrations of 1-octane 3-one, E-2-nonenal and Z-1,5-octadien-3-one increased during storage of the butter oil at room temperature.

Ghee

Ghee is anhydrous milk fat or the Indian clarified butter fat. Since time immemorial, ghee been used in Indian diet as the most important source of fat. It is prepared from either cream or butter obtained from cow or buffalo milk or their combination and has a pleasing and appetizing aroma. It is the most widely used milk product in the Indian subcontinent and is considered as supreme cooking and frying medium. Ghee undergoes oxidative degradation during storage resulting in alteration of major quality parameters such as colour. Flavor aroma and nutritive value affects its suitability for consumption. Ghee contains mixture of 44 lactones-saturated delta & gamma lactones C_6 - C_{16} , C_{19} (24 lactones) Gross lactones level of ghee is 30 ppm (Wadhawa and Jain, 1984) lactones are formed during heat treatments from the thermal breakdown of γ - and δ - hydroxyl acids (Forss, 1972) High lactones gives off flavour in storage ghee for 100-200 days. Characteristics flavor and pleasant aroma, source of fat-soluble vitamins, Medicinal Value of Ghee occupies predominant Position. Pleasing Flavour by FFAS C_8 - C_{18} ; C_4 and C_6 . FFA absent in free ghee C_8 - C_{18} are 0.4-1.0 mg /g i.e. 5-10% (Sharma and Bindal, 1986)

Cream

The flavour of cream is expected to differ from that of sweet cream butter mainly due to great contributions from the aqueous phase of milk and the fat globule. The compound Z-4-heptenal if present at about 1 part per billion, contributes to a full cream. Flavour and formed from Z-10 and 11), Z-15-octadienoic acids, which are themselves present in milk fat only to the extent of 0.02 %. (Haverkamp, P and poster J.C., 1964). Whipping may increase slightly the concentrations of oxidation product.

Shrikhand

Shrikhand-means the product obtained from chakka or Skimmed Milk Chakka to which milk fat is added. It may contain fruits, nuts, sugar, cardamom, saffron and other spices. It shall not contain any added coloring and artificial flavouring substances. It shall conform to the following specifications: In fruit Shrikhand milk fat on dry matter basis should be not less than 7.0% and Milk protein on dry matter should be not less than 9.0%.

Khoa

The milk product khoa obtained from cow or buffalo or goat or sheep milk or milk solids or a combination there of by rapid drying. According to Food Safety and Standard regulations 2011, khoa by whatever variety of names it is sold such as Pindi, Mawa etc. The milk fat content should be 30% on dry weight basis of finished product and citric acid not more than 0.1 % by weight. It shall be free from added starch, sugar and colouring matter. Higher amount of free fat (>60%) will be released in buffalo milk khoa than cow milk khoa. Higher free fat content contributes to soft body and oily or greasy appearance to buffalo milk khoa acts and, provided it is not overdone, the flavour is improved.

6. CONCLUSION

Concern of consumers about obesity, diseases and fat in foods changes the demand for fat. Therefore; the food industry is facing a challenge to produce fat-reduced products with comparable characteristics to the full-fat counterparts. With the intention of reducing fat in food, it is important to evaluate its effect on sensory properties. Furthermore, it has to be examined, how fat affects consumer liking and which sensory properties are responsible for the results. Consumers have increasingly recognized the link between health and diet. Recent medical research has found positive correlations between milk consumption and the reduction of risks for coronary heart disease and stroke (Shaper et al 1991; Massey 2001). Consumers' attitudes and perceptions of dairy foods have been shifting along with the evolving medical research findings and media exposure. Bovine milk therefore contains 15 and 7 to 8 mg/dl of cholesterol and phospholipids, respectively. Ross proposed the "response to injury hypothesis" as the primary cause of atherosclerosis

REFERENCES

- [1] Mendez M, Popkin BM. (2004) Globalization, urbanization and nutritional change in the developing world. Journal of Agricultural and Development Economics,.
- [2] Mishra and Gupta (2014) Food consumption pattern in rural India: A Regional perspective, Journal of Economic & Social Development, Vol. - X, No. 1, July, 2014.
- [3] Nair, K.R. and Vaidyanathan, A. (1978). Inter-state difference in milk consumption in India- A preliminary analysis, Working Paper No. 62, Centre of Development Studies, and Trivandrum.
- [4] Goyal A and Singh NP. (2007) Consumer perception about fast food in India: an exploratory Study. British Food Journal: 2007; 109 (2) 182-95.