Indian dairy industry is diversifying its production pattern to include specialty foods meant for specific targeted populations. Today consumers tend to believe that food that is purchased directly from the farmer is produced in an agriculturally responsible manner, and is, therefore, better tasting and fresher than what they can purchase from a supermarket. Traditional and farm-produced cheeses have niche and premium markets in the western countries. On similar lines, if cheese making principles can be applied to make artisanal farmstead cheeses in India, it will provide an impetus to the farmer for value addition, product diversification and augmented farm income.

Keywords: Artisanal, farmstead, cheese, value addition, product diversification; farm income

Introduction

Cheese manufacturing, the best way of preservation of milk solids, has been known for a long time. Cheese is valued for its easy portability, long life and good nutritive value. It has a compact structure and a longer shelf life than milk. It is very true that, traditionally India is not a cheese making country. This is evident from the data published by the FAO, which records the cheese production in India at 1500 tonnes as against a global production of 20167832 tonnes (www.faostat.fao.org). Nevertheless, Indians have, over the years, slowly acquired a taste for cheese and several varieties are now available in metropolitan cities of the country. Cheese consumption in the West is almost on the way to saturation, whereas countries that are traditionally not cheese eaters (Japan, China) have shown encouraging trends in cheese markets. This has prompted overseas cheese producers to explore the Indian market for its cheese varieties. While a few years ago Indians had access to only one type of basic cheese, several companies have started marketing different varieties of cheeses in Indian cities. Amul holds 60% of the current cheese market share in India, while Britannia Milkman holds 25%. Ten per cent of the remaining can be attributed to Le Bon, GoCheese and other regional brands (Mother Dairy and Vijaya). Imported brands such as Kraft and Laughing Cow have captured 5% (Jayadevan, 2013).

Indian dairy industry has been diversifying its production pattern to include specialty foods, which take cares of specific targeted populations. Today consumers prefer to purchase the product from farmers directly, for nutritional, social and personal reasons. Consumers tend to assume that food sold at these farmer markets is organic. This indicates that it is produced in an agriculturally responsible manner, and therefore, is better tasting and fresher than what they can purchase from a supermarket (www.expresshospitality.com).

Cheese making principles

Cheese was traditionally produced in the western countries on farms on small scales by hand, using the conventional craftsmanship of skilled cheese makers. Cheese making was considered an art, a traditional enterprise handed down from generation to generation. Nowadays, most of the cheese produced around the world is mass-produced on commercial scale, mostly in large factories and marketed on a global basis. The two main classes of cheese produced are marked as 'commodity' and 'specialty'. Commodity cheeses are produced on a large scale (e.g., Cheddar, Mozzarella, Swiss), while specialty cheeses are value-added products that have a
Farmstead and artisanal cheeses

Farmstead and artisanal cheeses are made on farm in small batches using high-quality ingredients. These products represent their specific regions and are usually prepared by families who have a history of two or three generations of production and have established a reputation for quality and variety for the same. American Cheese Society (http://www.cheesesociety.org) has defined speciality dairy products, artisanal and farmstead cheeses.

Speciality dairy products are products which are limitedly produced, with special attention paid to natural flavor and texture profiles. Specialty cheeses may be made from all types of milk (cow, sheep, goat etc.) and may contain flavorings such as herbs, spices, fruits and nuts. They demand a premium price from the consumers. More than 700 varieties of speciality cheeses have been identified from 64 countries (www.cheese.com).

Artisanal cheese is the cheese made by hand on a small scale, normally using milk from animals in a closed herd, and utilizing traditional and time honoured practices and using as little mechanization as possible. 'Artisanal' represents the unique characteristics and identity of each product and of the artisan who makes it. Artisan or artisanal - cheeses may be made from all types of milk and may include various flavorings.

Farmstead cheese must be made with milk from the farmer's own herd on the farm where the animals are raised. Milk used in the production of farmstead cheeses may not be obtained from any outside source. Farmstead cheeses may be made from all types of milk and may include various flavorings.

Artisanal and farmstead cheese are the part of speciality dairy products. All farmstead products are artisanal, but not all artisanal products may be farmstead. Artisanal cheeses may be made by mixing milk from several farms, whereas farmstead cheese requires that milk come only from one farm. Artisan cheese may also be termed as farmstead cheese only if it is made on a farm from the milk produced on that farm.

Global scenario in artisanal cheese making

Most of the more than 1400 cheese varieties with specific names that are known in the world today belong to one of 20 distinct types characterised by specific manufacturing conditions and compositional characteristics (Kindstedt, 2005). Such cheeses are generally grouped under any one of the cheese families that include fresh cheeses, bloomy rind cheeses, smear-ripened, hard uncooked, hard cooked and blue cheeses. In addition to the types of cheese mentioned above, they can also be classified by milk, country, texture, vegetarian (or not) etc. (www.cheese.com). Swiss cheese family that includes the Compte and Gruyere varieties is the typical example of a cheese family that employs similar manufacturing technology and chemical attributes. They are also classified as Alpine cheeses which are large and hard rinded. They are popular and produced worldwide but originated in Alpine regions of Switzerland and eastern France and are still made and marketed there as artisanal cheeses.

Family farms in the Italy make several varieties of cheeses on their farms. The manufacture of these cheeses is deeply rooted in tradition. Their fundamental differences from factory-made cheeses are that they are made entirely of raw milk with no starter addition. Fermentation is by natural flora of the milk and the container, many times is made of wood. No cheese knives as we know them now are used and the curd is cut either by a kitchen knife or mixed/broken by a wooden ladle. The curds are almost always cooked by addition of hot water (Ricotta being the only exception). The curd scooped out along with whey into meshed plastic baskets to facilitate natural whey drainage. The curd may or may not be pressed down lightly with fingers to accommodate more curd in the basket. The salting is done mostly by brining or rubbing dry salt on the curd mass. Some examples of farm-made Italian cheeses are Ragusano, Provolone, Pecorino, Ricotta and Montasio (Campo andLicitra 2006).

Artisan cheese makers can be found in large clusters in several states of the USA, including Vermont, California and Washington. The artisan cheese making groups in Minnesota are currently few, but the trend is growing and more farmers are being introduced to the art. Colby cheese is made by artisan cheese makers in Wisconsin. Sixty-eight percent of the specialty cheese businesses in Wisconsin are family owned (Greenberg, 2005). In Vermont, the artisan cheese makers have united under the banner of Vermont Cheese Council to promote the sale of cheese. They permit visits to their farm to observe the cheese making process as well as to facilitate
India has no history of artisanal cheese making. Paneer, the heat- and acid-coagulated product is the closest that India has, in the name of cheese. Another variety is Bandal or Bandel, which is an Asian cheese originating in a Portuguese colony of the same name located in eastern India. It is made from cow milk by separating the curds from whey with lemon juice. The whey is drained and curd moulded in small baskets, following which it is smoked. The cheese making tradition traces its history back to the arrival of the Portuguese. The production is concentrated in the Bengali villages of Tarakeshwar and Bishnupur near Kolkata (www.cheese.com). Interestingly, this cheese is classified as artisanal cheese, though it does not conform to the standard definition of cheese made from ‘enzyme-coagulated’ milk.

No direct data is available on artisan cheese production and sales volumes. As per a private survey conducted in the USA, the domestic artisan cheese production for 2008 was about 4 million kg, compared with the federal statistics of 195 million kg of specialty and artisan cheese combined, in Wisconsin alone in 2009 (Paxson, 2010). This report reiterates that the state and federal statistics do not differentiate between artisanal cheeses and industrially produced ‘speciality’ cheeses, which may be the reason for this disparity. Thirty seven per cent of the cheese makers surveyed produced less than 6000 pounds of cheese in 2008.

Farmstead/artisanal cheeses vs. commodity cheeses

Artisanal cheese can be classified under the broader title of ‘speciality cheeses’. These are characterised by unique qualities including milk of other species (sheep or goat milk for instance), special processing (handcrafted, traditional techniques, on-farm production), design, limited product supply, uncommon application, and/or extraordinary packaging or sale channel. Any particular category of specialty cheese has a unique flavour and quality which varies from batch to batch. Specialty cheeses are value-added products that have a high-quality flavour and appearance, are produced in much smaller quantities than commodity cheeses and demand a premium price from consumers. There are no complicated milk pipe lines to deliver the milk in case of farmstead artisanal cheese preparation and they are almost always made on the farm using equipment and implements that are commonly available in a kitchen. Commodity cheese is made in a factory, with the purpose of producing a cheese with lowest variation in taste or texture from one batch to the next. These include Cheddar, Mozzarella and Swiss cheeses that are produced in large quantities. In the factory, the proximity of animals is less, manual work is replaced by machinery and the scale of production rises from small (in kilograms) to large (in tons). Regional and seasonal variation diminishes from the farmstead to the industrial cheeses (Greenberg, 2005; MVAC Report, 2012; extension.missourie.edu).

Safety concerns about farmstead cheese production

Raw milk quality, clean milk production, hygiene at farm and animal health are the on-farm-dependent factors which decide the final quality of farmstead cheese. Unhygienic practices at farm level may lead to contamination that can result spoilage of the products as well disease outbreaks. The pathogens *Salmonella*, *Listeria monocytogenes*, *Staphylococcus aureus* and enteropathic* Escherichia coli* have been isolated from raw milk and pose great risk to the safety of cheeses by persisting in the cheese making environment (Le et al., 2014). In the USA, in order to address the food safety concerns voiced by the Food and Drug Administration (FDA) with reference to artisanal cheese making, several organisations have taken preventive steps to ensure safety of these cheeses. Important food safety information ranging from on-farm best practices to federal and state regulations are available at the ‘food safety resource’ developed specially for artisan and farmstead cheese makers by the Innovation Center for U.S. Dairy (www.usda.com). A USDA-funded project is running in the University of Vermont exclusively to identify and fill gaps in food safety research and extension for Vermont's artisanal cheese makers (http://fsrio.nal.usda.gov).

Farmstead artisanal cheese as markers of 'geographical indication'

Geographical Indications are place-based names given to agricultural products that convey their geographical origin as well as the cultural and historical identity (Bowen and Zapata, 2008). Some examples are Roquefort, Cheddar, Champagne, Swiss etc. The oldest and most well-developed systems of GI protection are found in Europe, especially France, Italy and Spain. In recent times, developing countries have increasingly begun focusing on GIs as a tool to boost rural development and protect local products and traditions. ‘Geographical Indication (GI) in relation to goods, means an indication which identifies such goods as agricultural goods, natural goods or manufactured goods as originating, or manufactured in the territory of a country, or a region or locality in that territory, where a given quality, reputation or other characteristic of such goods is essentially attributable to its geographical origin and in case where such goods are manufactured goods one of the activities of either the production or processing or preparation of the goods concerned takes place in such territory, region or locality, as the case may be’ (Gol, 2002). India, as a member of the World Trade Organization (WTO), enacted the Geographical Indications of Goods (Registration and Protection) Act, 1999, which has come into force with effect from 15th September, 2003.

Across the globe, particularly in the European Union, the framework of protected designation of origin came into effect
and is regulated by one or more of the following systems of geographical indications: Protected Designation of Origin (PDO), Protected Geographical Indication (PGI) and Traditional Specialities Guaranteed (TSG) (Tosato, 2013).

PDO caters to agricultural products and foodstuffs which are produced, processed and prepared in a given geographical area using recognised know-how (http://ec.europa.eu). The Protected Designation of Origin is the name of an area, a specific place or, in exceptional cases, the name of a country, used as a designation for an agricultural product or a foodstuff a) which comes from such an area, place or country b) whose quality or properties are significantly or exclusively determined by the geographical environment, including natural and human factors and c) whose production, processing and preparation takes place within the determined geographical area. Therefore, to be awarded the PDO status, the product must be traditionally and completely manufactured within the specific region and thus acquire unique properties. Ragusano, Zanetti Parmigiano Reggiano (Parmesan) and Grana are some examples of PDO-awarded cheeses.

PGI is for agricultural products and foodstuffs closely linked to the geographical area. At least one of the stages of production, processing or preparation takes place in the area. PGI is the name of an area, a specific place or, in exceptional cases, the name of a country, used as a description of an agricultural product or a foodstuff, a) which comes from such an area, place or country, b) which has a specific quality, goodwill or other characteristic property, attributable to its geographical origin, and c) whose production, processing or preparation takes place within the determined geographical area. Classic examples are Dorset blue cheese and Gruyere cheese.

TSG is indicative of traditional character, either in the composition or means of production (http://ec.europa.eu). Contrary to PDO and PGI, this status does not certify that the protected food product has a link to specific geographical area. To qualify for a TSG a food must be of 'specific character' and either its raw materials, production method or processing must be 'traditional'. Mozzarella is a typical example of a TSG certified cheese.

The French term 'terroir' is defined as an area or terrain, usually quite small, whose altitude, soil, native plant breeds and microclimate impart distinctive qualities to food products (Barham, 2003; Bureau and Valceschini, 2003; Berard and Marchenay, 2006). Cheese best expresses the character of the land, the macro-environment and the microclimate and captures the individuality and the uniqueness of the artisan who prepares it. This macro- and micro-environment is governed by the type of the soil, animal feedstuff grown on the soil, the flavours imparted to the milk from the feedstuff, the microorganisms present in the environment, the hygiene of the farm and cheese making premises, the special traits of and inputs from the person making the cheese etc. In many instances, the name of the artisanal or speciality cheese is related to its origin of village, state, country and other reasons, for instance, Swiss cheese from Switzerland, Roquefort cheese from France, Ragusano from Ragusa in Italy, Cheddar from Cheddar village in England etc. A European Commission report indicates that in 2010, the estimate of the sales value of cheeses under the framework of geographic indication in the EU was €6.3 billion and the sales volume was 866 000t. This represented 10% of the EU production, this share remained stable over the period 2005-2010 (Chever et al., 2012).

Artisanal cheese making from the Indian perspective

Advantages

1. The classic cheese making steps can be adapted to the Indian system, using implements and equipment that are normally available in a kitchen.
2. Artisan cheeses are the most successful speciality dairy products in foreign countries and its market is growing faster now, as many retailers feature local cheeses. The reason for the success of the speciality cheese sector is the opportunity for value addition associated with cheese and also lack of competition from the mainstream commodity sector, particularly in India.
3. Cheese is the fastest growing category of all dairy products (Sloan, 2004). There is an increasing trend in the specialty food markets in India, because of the consumers' readiness to buy high quality foods.
4. Making artisan cheese is a way to diversify and augment farm level income.
5. Farmstead cheeses have a long tradition, especially in Mediterranean areas to protect the cheeses as a part of their ethnic heritage. On similar lines, we can also attempt to make and market cheese(s) that are indicative of our region.

Challenges

Although consumers show increasing preference for healthier food, extra efforts will be needed to capture a good market for cheese in India, because it is still a rare commodity, the taste of which has to be developed among the populace. Awareness and familiarity of the consumers about product quality, its seasonality, availability, taste, consistency and high product cost are a few challenges that the artisanal cheese industry will have to address.

A blueprint for Indian artisanal cheese making

The method of manufacture of natural ripened cheese,
irrespective of the milk system from which it is made involves (a) optimum addition of starter culture (b) renneting of milk, (c) cutting the curd at the right firmness, (d) stirring and cooking the curd particles to the correct consistency and (e) draining of whey, (f) pressing, (g) salting and (h) ripening. Work is in progress in our laboratory at the National Dairy Research Institute, Karnal to standardise these techniques to suit the Indian conditions. The results are highly encouraging.

Conclusions

Milk produced in India is mostly on farms and consumed on the farm, save for sale as liquid milk. Value addition to milk in the form of products that can be manufactured on the farm and marketed at the farm level will fetch the farmer increased remuneration and improve his standard of living. Goods made on the farm by family traditions are termed as artisanal goods and have remarkable consumer response all over world due to their unique characteristics. Translating these concepts to the Indian farmstead to make cheese varieties on the farm maybe a viable way to sustain their existence, support the local economy, add diversity to the nation’s diet and preserve long-life methods and geographical identities. Artisanal cheeses are also a good platform for production of organic food products which are preferred by health conscious consumers.

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