Value addition of milk pdf

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SUBMITTED TO: Dr. Muhammad Fiaz SUBMITTED BY: 11-arid-961 Muhammad Zohaib Hameed 11-arid-962 Muzammal Tariq 11-arid-969 Shafqat Shabeer 11-arid-975 Waqas Nawaz 11-arid-985 Ayesha Azad 2. OUTLINE Unit 1: Unit 2: Unit 3: Introduction 1.1 Milk 1.2 Dairy products 1.3 Dairy by-products 1.4 Ranking wise milk production 1.5 Composition of milk (various types) Increase in value of milk 2.1 Increase in value of milk 2.2 Why process the milk? 2.3 Processing of Milk 2.3.1 Raw Milk Storage 2.3.2 Cleaning & De-creaming 2.3.3 Homogenization 2.3.4 Pasteurization 2.3.5 Ultra Heat Treatment (UHT) 2.3.6 Sterilization 2.3.7 Vitamin Fixing 2.3.8 Cooling 2.3.9 Storage, Filling & Packaging Milk 3.1 Milk 3.1.1 Whole milk 3.1.2 Culture milk 3.1.3 Half & Half 3.1.4 Evaporated milk 3.1.5 Sweetened condensed milk 3.1.6 Non Milk Fat Milk 3.2 Cream 3.2.1 Light cream 3.2.2 Light whipped cream 3.2.3 Heavy cream 3.2.4 Sour cream 3.3 Cheese 3.3.1 Dry quark cottage cheese 3.3.2 Huts cheese 3.4 Yoghurt 3.4.1 Low-fat yoghurt 3.4.2 Fat-free yoghurt 3.5 Butter 3.6 Ghee 3.7 Koa Milk By-Products 4.1 Whey 4.2 Skimmed milk 4.3 Buttermilk 4.4 Ghee Residue 3. Unit.1: Introduction 1.1 Milk: The lactum secretion, practically free of colostruums obtained by the complete milking of one or more healthy cows containing no less than 3.25% milk fat and no less than 8.25% milk solids-non-fat. 1.2 Dairy products: A dairy product is a food produced from the milk of mammals. Dairy products are usually high-energy foods. A dairy processing plant is called a dairy or dairy. 1.3 Dairy by-products: A by-product of milk may be defined as a product of commercial value which, in the manufacture of the main product. The newly acquired economic importance of a by-product will make it a major product in the future 1.4 Ranking Wise Milk Production: 1. India 2. USA 3. Pakistan 4. China 5. Brazil 6. Germany 7. Russian Federation 8. France 9. New Zealand 10. UK *WORLD: 721.4 million ton ECM 137.5 million ton ECM 84.3 million ton ECM 41.6 million ton ECM (2nd buffalo milk producing milk) 33.9 million ton ECM 32.0 million ton 31.1 million Tum ECM 30.1 million T€ ECM 25.2 million T= TZ 21.3 million T=N. ECM 14.1 million T=ECM **ECM (Energy Correct Milk) Ref: IFCN 2012 Dairy Report 4. 1.5 Composition of milk: Unit.2: Increase in value in milk 2.1 VALUE ADDITION TO MILK: Dairy farmers have the opportunity to upgrade raw milk by producing a variety of processed products in order to increase the return on the base price of raw milk. These include: heat-treated liquid drinking milk, such as pasteurization or ultra-high treatment, then adding flavors or adding to other beverages - separating the milk fat from other milk solids to produce butter and ghee, and also skimmed milk - fermenting milk for the production of yoghurt, which in some countries is also called quark. Whey - Use the by-products, skimmed milk and whey to produce ice cream, cheese and whey drinks. Add ingredients to heated milk to produce a variety of sweets such as caramel. • Further processing, such as adding acids to coagulant milk, produces different types of sweets. With cheese in the kitchen to produce high quality products such as cheesecake. The added value of raw milk can be achieved in a single holding or group of agricultural countries with a larger and often more reliable supply of the raw product. Development such as the metallurgical industry has several requirements that must be taken into account. These include: regular supply of quality-based milk that can be processed economically - infrastructure to support processing at farm, village and regional level - organisational support for farmers and agricultural communities in the development of processing skills - infrastructure for the marketing of the end products. 5. 2.2 Why process the MILK?? There are many reasons to process milk into dairy products, such as: many dairy products can be stored longer than fresh milk, so the milk does not need to be consumed immediately. Demand for fresh milk may be limited and there may be greater interest in dairy products. If the daily amount of fresh milk for sale is limited, it may be more economical to process the milk into less perishable products, store it and later sell it in larger quantities. There can be no market for fresh milk nearby, and only preserved products can be sold at a greater distance in markets. • A greater financial gain can be achieved. 6. 2.3 Processing of milk: The processing of milk involves the following steps; 2.3.1 Raw milk storage: Whole milk should be stored in the refrigerator at 4oC or less within two hours of milking. The storage time in the factory is a maximum of 72 hours. Longer holding time enables growth psychrophilic bacteria that can secrete heat-resistant proteases & lipases. A temperature treatment used to control bacterial numbers is thermization. Milk is heated at 57-68 oC for 15 seconds. This is only effective if the milk is cooled after treatment at 4 oC. This is applied to raw to be stored for several days before use. Its purpose is to reduce the gram-negative psychrotrophic perishing organisms. (Enzyme production) 2.3.2 Cleaning & De-cream (separator/filtration): Once the milk has been collected, cooled and transported to the processing plant, it is first clarified and means that all particles are removed. This uses the different densities of the particles and the milk matrix; essentially a decantation process. It can be silent (suspend) or removed by centrifugation. Centrifugal force is used to remove bacteria and their spores. Clarification: Removal of small particles ... straw, hair, etc. from milk; 2 lb/2,642 gal.. it is based on density bactofunation: centrifugal separation of microorganisms of milk: bacteria and especially spores have a higher density than milk. Two-stage centrifugation can reduce spore loads by up to >99%. The optimal temperature for clarification is 55-60oC microfiltration: microfilter membranes of 1.4 mm or less can homogenize to a reduction of bacteria and spores up to 99.5-99.99% 2,3,3: Definition: treatment of milk or a milk product to ensure the breaking of fat balls so that after 48 h at 40oF (4.4oC) no visible cream separation occurs. Homogenization breaks the oil droplets into milk and prevents the cream from separating and forming a layer. This is of particular importance for sterilized milk, which has a long shelf life and if the formation of a cream layer is not desired. Other changes include increased viscosity and a richer taste. Homogenizers are usually designed for industrial production. Homogenization is a mechanical process in which milk is forced by a small passage at high speed. Effects of homogenization: - No cream line formation by smaller fat balls Whiter color & more full-bodied taste, better mouth-feeling 7. Process requirements: Homogenization most efficient when the fat phase is in a liquid state - cream >12% fat cannot be homogenized at normal pressure, high pressure homogenization is necessary 2.3.4 Pasteurization: Pasteurization is a relatively mild heat treatment (usually below 100°C), which is used to extend the shelf life of milk by several days. It preserves milk by inactivating enzymes and destroying heat-sensitive microorganisms, but causes minimal changes in the nutritional value or sensory properties of a food. Some heat-resistant bacteria survive to spoil the milk after a few days, but these bacteria do not cause food poisoning. The time and temperature combination required to destroy target microorganisms varies depending on a number of complex related factors. For milk, the heating time and temperature is either 63°C for 30 minutes or alternatively 72°C for 15 seconds. Only the first combination is possible on a small scale and requires the simplest equipment, which is an open sied pan. Better control is used with a steam and this can be equipped with a stirrer to improve the efficiency of the heating. Both are batch processes that are suitable for small-scale operation. A higher production rate can be possible with a pipe coil pasteuror. This device has been tested and has been successful in some fruit products, but is still in a development alder. 2.3.5 Ultra Heat Treatment (UHT): Milk is heated to a higher temperature than pasteurized milk, stays fresher, has a longer shelf life (up to 3 months) and no bacterial growth, as milk is packaged in sterilized, air-free packaging. 2.3.6 Sterilization: Sterilization is a more severe heat treatment designed to destroy all contaminating bacteria. The milk is sterilized at a temperature of 121°C for 15-20 minutes. This can be achieved with a retort or pressure cooker. In contrast to pasteurization, this process leads to significant changes in the nutritional and sensory quality of milk. In some countries, flavoured milk has become a very popular product. However, sterilization is not recommended for small series production for the following reasons: The cost of a retort and additional equipment is high for the small processor. • It is important that the correct heating conditions are carefully defined and maintained for each processed milk section. When the milk is overheated, the 8th quality is reduced, and it can have a fairly burnt taste and aroma. If the milk is not sufficiently heated, there is a risk that microorganisms will survive and grow in the bottle. In low-acid foods such as milk, many types of bacteria, including Clostridium botulinum, can grow and cause severe food poisoning. Due to the potential dangers of food poisoning, the skills of a qualified food technologist/microbiologist are required to routinely examine samples of sterilized milk exposed to accelerated storage conditions. This requires the supply of microbiological media and equipment. In summary, the sterilization process requires significant investment, the need for trained and experienced personnel, regular maintenance of demanding equipment, and comparatively high operational overhead. 2.3.7 Vitamin enhancement: 78% of milk sold in PAKISTAN is enriched with vitamins A and D. Some milk is also enriched with additional protein and calcium. 2.3.8 Cooling: Pasteurization does not destroy all microorganisms, so the milk needs to be cooled quickly to prevent the growth of surviving bacteria. Cooling can be achieved on a small scale with a bottle cooling system. 2.3.9 Storage, bottling & packaging: Pasteurized milk has a 2-3 days if it is stored at 4°C. Maintaining this low temperature leads to a significant increase in transport and distribution costs and therefore poses a major disadvantage to the development of a small pasteurised dairy business. When packed in sealed bottles and stored in the room sterilized milk should have a shelf life of more than six months. • Packaging functions: Enable efficient food distribution - preserve product hygiene - protect nutrients and taste - reduce food spoilage, communicate product information - Various containers: glass bottles (translucent vs. dark): can be reusable or recyclable. Unit 3: Dairy products: 3.1 Milk: 3.1,1 Whole milk: Contains no less than 3.25% milk fat (fat solids) and 8.25% fat-free solids. The addition of vitamins A and D is optional, but when vitamin A is added, it must be present at a level of at least 2,000 international units (I.U.) per quarter. When vitamin D is added, it must be present at 400 I.E. per quarter. 3.1.2 Culture milk: Contains no less than 3.25 percent milk fat (fat solids) and 8.25 percent fat-free solids. The cultivation of one of the following dairy products alone or in combination produces it: cream, milk, partly 3.1.3 Half and half: Consists of a mixture of milk and cream containing no less than 10.5% milk fat but less than 18% milk fat. 3.1.4 Evaporated milk: evaporated milk is produced by removing about 60% of the milk water. It contains no less than 6.5% milk fat, not less than 16.5% non-fat-free solid; and not less than 23 % by weight of total milk solids. Evaporated milk is a heat sterilized product with an extended shelf life with a yellowish color and boiled taste. 3.1.5 Sweetened condensed milk: This product results from the removal of about 60% of the water from a mixture of milk (full- and fat-free pasteurised, homogenised milk) and carbohydrate sweeteners such as sucrose. This product contains no less than 8% milk fat and no less than 28% total milk solids. It is obtained by removing water 10. only from pasteurised skimmed milk (unless otherwise stated). 3.1.6 Fat-free dry milk: Fat-free dry milk is produced by removing water from pasteurised skimmed milk (fat- or fat-free). The product contains no more than 5 wt .-% moisture and no more than 1.5% milk fat (unless otherwise stated). 3.2 Cream: After the milk has been left at the lowest possible temperature (4-12°C) for about 24 hours, the cream can be emaciated with a spoon or saucer. This method takes advantage of the fact that cream rises and then stays on top of the milk. It contains most of the milk fat. Only cow's milk produces light cream in this way; other types of milk require a hand creamer (centrifugal milk separator) to separate cream and milk. 3.2.1 Light cream: It contains no less than 18% milk fat, but less than 30%. Slightly creamy can also be called coffee cream or table cream. 3.2.2 Light Contains no less than 30% milk fat, but less than 36% milk fat. It can also be called Whipping Cream. 3.2.3 Heavy cream: Contains no less than 36% milk fat. Heavy creamy can also be called heavy whipped cream. 3.2.4 Sour cream: The product resulting from the addition of lactic acid-producing bacteria to pasteurised cream containing no less than 18% milk Sour creamy can also be called cultivated sour cream. 11. 3.3 Cheese: 3.3.1 Dry Curd Cottage Cheese: A soft, unripened cheese made from skimmed milk and/or reconstituted fat-free dry milk. The cheese quark is formed by adding lactic acid producing bacteria (cultivated) or acidifiers (directly adding lactic acid). The latter is called direct acidification. Rennet and/or other suitable enzymes can be used to support quark formation. Dry quark cottage cheese contains less than .5% milk fat and no more than 80% moisture. The product can also be referred to as cottage cheese dry quark. 3.3.2 Cottage cheese: The product resulting from the addition of a cream mixture (dressing) to dry curd cheese. Cottage cheese contains no less than 4% milk fat and no more than 80% moisture. 3.4 Yoghurt: Yoghurt is produced when milk becomes acidic from certain lactic acid bacteria that prefer rising temperatures well above room temperature: 37 –45°C. The milk should first be heated to 85°C or higher. A high pasteurization temperature (above 72°C) gives the final product a better consistency (thickness). After the milk is acidic, the resulting yogurt can be used to make more fresh yoghurt by adding it to fresh milk. Yoghurt: The product resulting from the cultivation of a mixture of milk and cream products with lactic acid producing bacteria, Lactobacillus bulgaricus and Streptococcus thermophilus. Yoghurt contains no less than 3.25% milk fat and 8.25 percent fat-free solids. 3.4.1 Low-fat yoghurt: Similar to yoghurt, except that it contains no less than .5% milk fat and no more than 2% milk fat. 3.4.2 Fat-free yoghurt: Similar to yoghurt, except that it contains less than .5% milk fat. 3.5 Butter: When swirling the cream, sour cream or sour milk is intensively mixed with air. This process causes fat balls to flake (or stick together) and produce butter and buttermilk. The easiest way to make butter from small amounts of milk is to use a bottle or glass that can be covered with a well-closed lid or a simple bowl of rackets. If large amounts of milk or cream are available, you should consider acquiring a real migration. Several types are available. The Churn tub is a simple method that is often used in the tropics. A cheap and practical domestic churn is a glass pot with a paddle attached to a screw at the top. The paddle can be rotated manually. This exodus is difficult to clean. It is best to rinse it with water before use to prevent the butter from sticking to the sides. Churns should not be filled with more than a third of sour milk or cream. Churn with a regular and down or sideways movement. Stop raging when the butter particles reach the size of rice grains or peas and the buttermilk looks more liquid. If no grains have been formed after 30 minutes, you can change the 12. Add a little clean cold or warm water. See also the comments made at the end of this The amount of added water should never exceed 25% of the total amount of cream or milk. The butter particles float at the top of buttermilk because butter is lighter than buttermilk. This facilitates the separation of the two products by pouring the buttermilk through a coarse sieve. Never add too much water, otherwise the buttermilk will water. 3.6 Ghee: To make ghee, you need: • Butter • a heat source • a pan • a metal spoon. Heat the butter until water and fat form separate layers; the fat floats up. There are two ways to remove the water: the existing water evaporates. • It is possible to remove the fat layer with a spoon. This fat should then be reheated. The scum that will form must be harvested regularly, preferably with a skimmer. The color of the ghee can vary from almost white to dark brown. A rancid taste is acceptable, but if it tastes burnt, it should be discarded. 13. 3.7 Koa (Khoa): Koa or Khoa is a kind of concentrated milk. You need: • fresh (uncooked) whole or skimmed milk • a heat source • a flat, clean, wide iron pan with a thick, flat bottom • a flat, clean metal metal for stirring (e.g. a flat pancake filler). Fill the pan with the milk up to 30 to 50% of its capacity. Bring the milk to the boil, stirring constantly. The water evaporates and after some time the milk will reach a certain viscosity, which means that the milk thickens. Be sure to scratch the sides of the pan when stirring. Once the milk has reached a dough-like consistency and stirring does not prevent the mass from sticking to the side of the pan, you can remove it from the heat source and lower the temperature by at least 20°C. At that time, the water content should have been reduced to about 40% of what it was. Remove the lump from the pan, place it on a cold surface and smooth it. After cooling, the koa is firm and can be cut into squares. It will have a sweet, nutty taste. Koa can only be stored for about 2 - 5 days due to a possible re-infection. The preparation of Koa requires a lot of time (a few hours) and fuel, in addition, 1 liter of milk produces only 0.4 liters of koa. Unit 4: Dairy by-products: The inevitable problem of the use of by-products occurs in the production of various dairy products. Due to their unique and important nutrients available in the by-products, they must be used properly, taking into account the well-being of the general masses. 14. The conversion of edible nutrients into non-edible substances is not affected by the rampant malnutrition that has led to the impoverished stares in the face, do nothing good. The profitability of the dairy can be significantly improved by the economic use of milk by-products and can be regarded as a prerequisite for a profitable dairy business. Technological progress leaves the scope for the creation of newer channels wide open Use of by-products from milk processing. 4.1 Whey aqueous part of the milk produced when raw milk is acidic and coagulates. It has low firm & high lactose. 4.1.1 Sour whey: from cheese cured by crops (or acid) watered down to 4.6. E.g. cottage cheese 4.1.2 Sweet whey: drained from quark, which is formed by rennet clotting. E.g. cheddar 4.2 skimmed or skimmed milk. Culturing usually involves the addition of certain characteristic ingredients and lactic acid producing bacteria. An example of cultivated milk is buttermilk. Sr. No. 1 3 4 By product skimmed milk Butterbuttermilk Cheese, Casein Channa, Paneer 2 Main Product Cream Whey Ghee Ghee Residues Processing Process Pasteurization Sterilization Fermentation, Concentration Concentration Serving Serving Milk Prepared Flavoured Aromatic Buttermilk Cultivated Buttermilk Concentrated Sour Milk Plain and Sweetened Condensed Skimmed Milk Dried Skimmed Milk or Skimmed Milk Powder or Non Fat, Edible Casein Fermentation, Concentration Condensed Buttermilk Concentration , Yeast Whey Concentration Plain and Sweetened Condensed Whey, Whey Protein Concentrate, Whey Paste, Lactose Dried Whey Coagulation Ricotta Cheese Processing Sweet Meat, Toffee, Sweet Paste