

Dairy Products

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Abstract

Dairy products are products derived from milk for various purposes. Dairy products ranges from edibles such as creams, milk powders, alcohol, skimmed milk, casein, whey, butter, cheese, lactose, chocolate milk, milk drinks and various traditionally produced dairy products. Non edible derivative include fabrics and plastic products. Several newer dairy products are yet to be harnessed from milk. This would create frontier for production of newer dairy products.

Livestock keeping for dairy and other purposes has been since ancient times. The pastoral livestock keeping for multipurpose reasons including milk production was solely for domestic use. This period was marked with production of mostly organic dairy products with great health benefits but with extremely low shelf life.

The emergence of civilization and development brought organized dairy keeping with specialized dairy breeds solely for milk production. This ushered in commercial dairy production which enhanced income generation of farmers and contributes to growth of economy of most countries.

Most commercial dairy products are bedeviled with harmful substances as preservatives. The use of preservatives such as sodium tripolyphosphate in dairy products although are safe for consumption poses long time harmful effects to humans. Dairy industry should as a matter of necessity abolish the use of such substances and source for safer methods of extending the shelf life of dairy products. Future prospects in the industry would include provision of Government regulations to over sea the activities of dairy industries and dairy products available in the market.

Introduction

The word "Dairy" implies milk, derivatives and processes including livestock such as cow, mare and doe and workers involved in its production. Dairy products are milk- based products processed and formulated into various culinary needs to satisfy consumer demand and provide market and resources to farmers. These needs vary from country to country and depend on factors such as: level of technological advancement and development and the size of dairy livestock in a country. Accurate statistics on dairy livestock

production is vital for informed knowledge of quantity of milk produced in a country. Lack of such information in most under developed countries such as Nigeria affects production level despite her relatively large livestock production.

The rearing of animals for dairy and other purposes have existed decades ago in most countries. These animals were mostly kept by nomads as part of subsistence farming practice. In Nigeria, Fulani nomads were the main people involved in dairy production. They

constantly move with their herds as they transverse the entire country in search for green pasture for their livestock. Sometimes their wives are engaged in milking of the cows solely for domestic use.

More recently the agricultural society initiates cottage industry involved in dairy keeping for milk production both for domestic and commercial purposes. Animals kept in the industry serve several purposes as dairy, draught for farming purposes and meat when spent. These animals were commonly milked by hand by a number of herdsmen and women depending on the herd size.

The state of unorganized dairy practice significantly influenced availability of dairy products and market in the country. However despite these challenges dairy industry in Nigeria still remains one of the important components of agricultural sector of the economy with great economic, nutritional and social implication (Olalokun, 1976).

In most industrialized and developed countries, dairy production has been transformed into commercialized industry with specialized breed of dairy cattle distinct from beef or draught animals. The labor force of herd workers drastically shifted to mechanization with milking machines. However the industry was faced with challenges such as irregularities in milk production which is an important factor of dairy biology. The influence of dairy biology on commercial dairy production was soon tackled by the use of bovine somatotropine hormone- a potent high milk inducer hormone.

The introduction of a recombinant (synthetic rBST) by the food and drug administration in US market marked a tremendous increase in commercial dairy production in US. The prospect was short lived due to speculations of adverse effect of the hormone on both dairy animals and man.

An European Union Scientific Commission enlisted rBST as a potent inducer of diverse health conditions in dairy cows including foot problems, mastitis, injection site reactions, impinged on animal welfare and cause of other reproductive disorders. Following this, the use of rBST was banned in most countries including Canada. Soon rBST based milk lost consumers popularity to rBST free milk inadvertently depreciating level of production. Despite this dairy production has become major source of income growth for many farmers (FAO, 2009).

Production of Dairy Products

In some countries such as Nigeria where there is no ban on consumption of unpasteurized milk, most nomads and Northerners

take freshly prepared and unpasteurized milk. Freshly prepared milk is rich with most essential nutrients and proteins good for healthy life. It may however contain diverse bacteria both normal flora and pathogenic species with public health hazards. Harmful bacteria that maybe found in the milk include: brucellosis, cowpox, leptospirosis, tuberculosis, listeriosis, crohn's disease caused by mycobacterium paratuberculosis. The knowledge of this brought the wake of milk pasteurization.

In most industrialized countries freshly produced milk are processed in dairy processing plants into diverse dairy products. About 63 milk plants exist in Nigeria however many are grounded due to facility breakdown and shortage of materials (imported powdered milk) (NLPD, 1992). Milk is subjected to various treatments to extend its market and shelf life.

Dairy processing is mainly of 2 types: pasteurization by heat treatment to denature the microbial component of milk and make safe for human consumption. Pasteurized milk are used in preparation of dairy products such as ice creams, chocolate milk drinks, yoghurt, cheese and varieties of milk drinks. The second type is the dehydration process which yield solid dairy product such as butter, hard cheese and various kinds of milk powders.

Traditional Dairy Products

The wife of nomads usually process fresh milk into various traditional dairy products. These products include: burukutu, nono (sour milk), kindimo (sour yoghurt), maishanu (local butter), cuku (Fulani cheese) and wara (Yoruba cheese). Traditional dairy products are mostly produced in small scale for domestic purposes.

The variety of traditional dairy products is limited by size and quantity of milk from the dairy and availability of facilities for milk processing. Most of the dairy products are organic products without preservatives. This affects the market and shelf life and such products must be sold within hours of production to prevent deterioration and economic waste. However with the recent awareness and increase in dietary related diseases, there has been an increase in consumer's choice of organic dairy products.

Cream

Milk is separated into two main components namely: cream and skimmed milk. Several dairy products are derived from both milk components. Cream is processed into various components depending on consumer's demand which differs from countries and its level of development. It also depends on the cream consistency.

Thick creams could be processed into dry and powdered milk or condensed by evaporation and mixed with graded amount of sugar. Some dairy companies produce cream milks such as Loya®. Such cream milk is rich in fat and lactose and is best for growing children than adults. In most countries such as Nigeria, New Zealand and Australia, thick creams are processed into butter.

Powdered Milk

Milk powder is derived from processing creams into dry powders which is preserved and packaged in consumer sized bags. Cream is subjected to very high heat treatment and evaporation into milk powder. This process extends its shelf life and preference over liquid milks. Most commercial dairy farmers prefer powdered milk due to ease in its transportation.

Some countries like Nigeria import powdered milk despite its relatively large livestock population to meet the dairy needs of the country. In most countries, milk powder is processed into wide range of products to meet diverse and special customer needs. Various dairy companies package milk powder products such as Peak® powdered milk, Oldenburger®, blue boat® and others. It is used in production of products such as ice cream, infant formulae, and nutritional products for invalids, athletes, hospital use, liquid beverages, snacks, and confectionaries.

Chocolate Milk Drink

Chocolate milk drink is a dairy product made from cream. It is essentially composed of water, full cream milk powder, sugar, cocoa powder, stabilizer, sodium tripolyphosphate, common salt, chocolate flavor, milk flavor, vitamins such as A, D, E and Acesulfame-k. Chocolate milk® drink is highly rich in fat and nutrients essentially good for growing children. The drink however may not be healthy due to the informed adverse effect of the preservative used in the product.

Sodium tripolyphosphate (STPP) in chocolate milk drink preserves the tenderness and moistness of the product and although it's safe for ingestion, it is suspected to cause neurotoxin according to the National Institute for Occupational Safety and Health's (NIOSH) Registry for toxic effects of chemical substances. Food products preserved with STPP may cause skin irritation.

In US, STPP was listed as a registered pesticide and an air contaminate under the US Environmental Protection Agency's Federal Insecticide, Fungicide and Rodenticide Act and California's occupational and safety Health Act respectively. The substance was

equally listed under the Material Safety Data Sheet list as a toxic substance in the lungs capable of causing organ damage on prolonged exposure (Fibro Relief, 2013). This fact would no doubt reduce consumer's request for the product however the relishing taste and probably public ignorant has maintained the product in the market.

Coconut Milk Powder

The dairy product is produced from powdered milk. It is an organic dairy product fortified with fresh coconut and other nutrients. It is formulated without preservative and therefore has a short shelf life. The shelf life could be extended by refrigeration. The product has gained increased market demand due to non preservative nature of the drink.

Yoghurt

Yoghurt is a dairy product produced from processing whole milk through bacterial fermentation. The product has a natural sour taste from fermentation but is usually sweetened with sugar. Yoghurt is richly packed with natural bacteria or probiotics such as lactobacillus, delbrucekii subsp. bulgaricus, streptococcus thermophilus, actobacilli bifidobacteria that provides diverse health benefits.

Some countries require addition of certain amount of colony forming units of microorganism (SWISS Food Law). Scientific findings have revealed the health benefits of probiotics in maintenance of gastrointestinal integrity including other health benefits. However the amount of health benefit is not commiserating to the market demand. This may be due to the lactose taste of yoghurt and fear for lactose related illness such as diabetes mellitus. Some of the products include: Matsoni Georgian Yoghurt, Caspian Sea yoghurt popular in Japan, Khyar W Laban (cucumber and yoghurt salad popular in Lebanon and Syria), Rahm yoghurt high in fat (10%) content.

Butter

Butter is a dairy product produced from churned cream. Churning process coagulates cream into fat globules of monolithic masses. The butter mass is washed and maybe salted for preservation. The finished product is packaged into consumer sized packs. The residue butter milk from washed butter is further processed into a different culinary product. Different dairy companies produce different types of butters which maybe fortified with vitamins and minerals. Some of the products are Blue band margarine®, Sea boat butter®.

Skimmed Milk

Skimmed milk is the portion of milk left after extraction of cream from whole milk. Recent concern on the increasing health challenges from excessive fat deposition has increased consumers choice for skimmed milk. Small portion of cream is added to skim to produce varieties of low fat milk. The milk may be fortified with vitamins and flavor to improve taste and consumers desire. Some examples of skimmed milk include: Marvel skimmed milk®, Nido milk®, Dano camel milk® and Sell powder milk®.

Casein

Casein is the major phosphoprotein present in fresh milk and could be processed into different consumer products. Casein is commonly used as fillers in ice cream production. It's also processed into products such as lactose, fabrics, adhesives and plastics.

Cheese

Cheese is a dairy product derived from whole milk. Whole milk is processed into curds that can be compressed and stored to form cheese. Varieties of cheese could be produced from activities of normal flora naturally present in milk. Elimination of these bacteria through pasteurization limits the range of cheese available.

Some variety of cheese contains less amount of lactose compared to whole fresh milk. The reduction could be from processes of fermentation and high fat content of cheese. Lactose reduced cheese are well tolerated by lactose intolerant individuals thereby increasing its consumer demand and market value. Traditionally made cheese products such as "Emmental" or "Cheddar" contain less than 10% of lactose. Reduction in cheese lactose could be related to the aging process in cheese (Dairygood.org).

In some countries dairy aging is governed by regulation (Farmhouse cheese markers.com). However most commercially produced cheese do not undergo the normal aging process and as such contains higher lactose content compare to traditionally made cheese. Regrettably, most marketed cheese products do not indicate the lactose content nor give detailed relationship of duration of aging to lactose content. Some cheese products in the market include: Cheddar®, Kraft®, and Tuscany ® cheese.

Whey

Some decades ago, whey commonly known as milk serum was used to feed pigs and other farm animals as means of disposal. Whey contains 95% water and other value proteins, lactose and dissolved salts. Nowadays, whey is processed

into various products such as lactose and lactalbumin used in baking, for specialty food and to fortify some pizza cheese.

Lactalbumin is an insoluble protein and is not a good agent for binding, foaming or gelling food substances. Alcohol is also produced from whey through fermentation of lactose by a variety of organisms. This process releases products ranging from lactic acid to flavorings materials. Some countries such as New Zealand uses yeast to ferment whey lactalbumin serum to alcohol. The alcohol is recovered by distillation to yield industrial graded alcohol (Archer, 2015).

Milk calcium and phosphate are two important minerals derived from whey ultrafiltration permeate. Both minerals are produced under suitable concentrations, pH, time and temperature. Milk calcium and phosphate are valuable nutritional supplements for women against osteoporosis. Milk calcium is supplemented in dairy products including: Milk, yoghurt, confectionaries and other culinary products.

Lactose is used in preparation of most confectionaries and ice creams. In conclusion; Dairy industry is an ever growing industry in most countries. The industry possesses opportunities for production of more dairy products for future market. These products are constantly needed by children within the growing age which represents about 30% of the total human population. Different types of dairy products are basically required by all age brackets in a population.

Most farmers generate their daily income from dairy products. In some countries, dairy products contribute the major gross domestic products and an important source of revenue generation in the country's economy. Despite the unorganized nature of dairy industry in some countries, the industry contributes significantly in the growth of economy.

Hence the industry must be regulated by active government policies guiding the activities of dairy industry as it regards to state of facilities and production of adequate dairy product for the country. The policies should encourage production of organic dairy products due to its health benefits although this may not be feasible in commercial scale. The short shelf-life of organic dairy products is extended by addition of preservatives which are essentially incompatible with life.

Dairy industries therefore should explore the use of more health tolerant additives in commercial dairy production. Most importantly detailed information on the preservative used in a dairy product should be provided on the body of the product.

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