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FOOD MICROBIOLOGY

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Abstract:
Microbiology is branch of biology that deals with study of organisms too small to be seen without any magnification. Microbiology is study of different microorganisms like bacteria, viruses, parasites, molds ,Yeast etc. New development in our understanding of microbial genetic could affects onour concept microbial taxonomy. Food microbiology is described briefly in this review article.it will help to understand quality and safety of organisms or microorganisms in food products.

Keywords: *Microbiology, taxonomy, parasites , Quality, safety.*

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INTRODUCTION:

Milk is mixed with sulphuric acid and iso-amyl alcohol. In a special gerber tube, permitting dissolution of the protein and release of fat. The method is suitable as a routine or screening test.

The tubes are centrifuged and the fat rising into the celibrated part of tube is measured as apercentage of the fat content of the milk sample.

It is an empirical method and reproducible result can be obtain if produce is followed correctly. Milk isan nutrient-rich liquid food produced by the mammary glands of mammals.

Early location milk is called colostrum, which contains antibodies that streng then the immune systemand thus reduces the risk of many diseases. In holds many other nutrients.

Abstract:

I have been astonished to learn from your English government Blue -book about the scandalous, unnecessary and unnatural practice prevailing in England of putting drugs into milk for purpose of its preservation. A wrong and unnecessary act of adulteration.

All milk drawn from healthy Cows is yielded sterile. The remedy against the use of drugs and late-refrigeration, and c, is to purify and preserve the milk in its natural sterile condition by quickly ondrawing it aerating, cooling and refrigerating

It is down to the non -decomposing and non-fermenting temperature of 50 degree fahrenhait or lower at the farms and rural factories before being sent off from the country, and having it conveyed, so chilled, into ordinary cold stores the same as doubtless most of your butchers' Have heard of a new method of milk preservation based on the influsion of gases (oxygen and carbonicacid) into milk.

By all means let the prohibition be utterly complete, and thus allow the consumer to drink natures production and not chemical compounds. Whatever may be the merits of its new process I am not prepared to say, but if drugs are to be consumer to drink your farmer and milk distributors certainly need reform in their system for you cannot possibly compete In quality of milk . Butter cheese withother.

Milk gone good:

Spoiled milk can do a disgusting number on a cup of coffee, Tebowl of cereal, or strawberry smoothiesand an unexpected gulp of it is a definitely off putting way too start the day.

To date, the best bet for steering clear of bad milk is the whiff test that is, take a sniff and if the milk in your cartoon smells funky, don't drink it.

Spoiled milk surprises, however may soon be a thing of the past thanks to a technological nose innovation developed at the university of California ,Berkeley. And national chiao tung u. University inTaiwan.

Teams from these institutions have developed a 3-D printed smart cap. Not fat milk should be good past the printed date. Reduced -fat milk should be good 7 days past theprinted date, whole milk should be good. 5-7 days past the printed date.

Spoiled milk can do disgusting numbers on cup of coffee, bowl of cereal, or strawberry , Smoothie, and an unexpected gulp of it is the simply place the sour milk over your face and let it sit. It may not given off the most fragrant of smells, but lactic acid given your skin a healthy boost.

Milk gone Bad:

Spooled milk has a distinct sour odour ,which is due to lactic acid produced by bacteria. Other sings of spoilage include a slightly yellow colour and lumpy texture (15) . Signs that your milk has spoiled and not may not be safe to drink include a sour smell and taste, change in colour, and lumpy texture.

The teste also begins to change As the nature sweethness of fresh milk is quickly replaced by a somewhat acidic or sour flavour . With enough time, the texture and colour of milk that has spoiled will changes as well. It may begin to develops a slimy, chunky texture and dingy, yellow colour.

It can cause food poisoning that may result in uncomfortable digestive systems ,such as stomach pain,neusea , vomiting and diarrhea . You don't nerd in to worry if you accidentally ingest a smell sip of spoiled milk But avoid drinking it is large or even moderate quantities.

when milk, can dangerous to your health Studies have shown that drinking large amounts of milk does not protect men or women from bonefractures and this is associated with an overall higher risk of death during the study period.

Milk and other dairy products are major sources of saturated fat in your diet, contributing to Alzheimer's disease, type 2 diabetes and heart disease. Studies have also linked dairy to an increased risk of breast,

ovarian and prostate cancer.

WHO / FAO, are:
The definition of pasteurization is "a microbial heat treatment". Aimed at reducing the number of any pathogenic microorganisms in milk and liquid milk products, if they exist, at that level they do not pose a significant health risk.

13 REASONS TO STOP DRINKING MILK:

1. Broken bones:
This study states that the more milk you consume, the more likely you are to develop a hip fracture. Somilk is not important to improve bones.

2. Prostate cancer:
Regular consumption of dairy products has also been linked to prostate cancer.

3. Lactose intolerance:
Cow's milk contains a sugar called lactose, which can be difficult for some people to digest, resulting in nausea, cramps, gas, bloating, and even diarrhea.

4. Acne:
In many studies, the use of all types of dairy products "products" has been linked to the increasing prevalence and severity of acne in both boys and girls.

5. Cholesterol:
Blood cholesterol comes directly from your diet. According to the USDA, 100 grams of regular cow's milk contains 10 grams of cholesterol, which makes it dangerous for the body to consume large amounts every day.

6. Ovarian cancer:
A Multiple studies shows that women who consumed more servings of dairy "products" each day were twice as likely to develop serous ovarian cancer.

7. Milk allergies:
A different beast than lactose intolerance, milk allergies can cause potentially strong and dangerous reactions (usually in young children), such as vomiting or anaphylaxis.

8. Antibiotics:
When humans are infected by these superbugs, antibiotics at best have decreased effectiveness and at worst are powerless.

9. Saturated fat:
Dairy products, especially whole milk, contain high levels of saturated fats, which can increase the riskof heart disease.

10. Weight gain:
While many are looking for ways to lose weight, people often switch from full-fat milk to skimmed as one of their weight loss strategies.

11. Sodium level:
Varieties including halloumi, imported blue, feta, and Edam (as well as processed cheeses) are so loaded with sodium that they're actually saltier than seawater.

12. Common Sense:
Cow's milk satisfies human nutritional needs Not possible, so it is not surprising that consuming its derivatives causes you many problems.

13. Diabetes:
It may also be high in fat and carbs, making it risky for people with diabetes.

Milk perspective for future work, Dairy products are one of the best products for the body and over time, in its market The demand is very high. The objective of this study is to provide a vision for the future of the dairy industry based on various aspects based on expected technological development, demand trend, economic trend and future expected products of the industry.

Carbonates and proteins are early developed in milk during air storage possibly leading to an early appearance of fruity and dairy notes whereas their contribution is negligible in VP storage.

An interesting perspective is the possibility to use the major dominant VOCs as possible marker molecules in intelligent packaging devices for an early detection of milk spoilage.

In the studies shows , It is expected that the main and traditional dairy industry products such as liquid and concentrated milk, milk powders, milk protein ingredients, milk fat products such as cream, butter and butter blends are also available and remain into the future.

Future dairy factories include many important traditional processes that are currently used in the manufacture of dairy products with improved efficiency (e.g. heating, homogenization, concentrationand drying).

Microbial metabolites produced during milk storage,

Impact of storage conditions and downstream treatments on the microbiology of raw milk.

Cold storage:
Milk is usually stored at refrigeration temperatures which slows down the growth of most bacteria, with the exception of cytotolarant microorganisms which can grow in large quantities in these conditions and can be a major cause of milk spoilage.

These bacteria can become the predominant microorganisms in raw milk stored at low temperatures, constituting up to 70–90% of the microbial population.

Temperatures:
In that group, microorganisms are perfect for growing in a very wide temperature range. However, in any particular environment, the number depends largely on the temperature and the type of microorganism. Depending on the temperature, microorganisms can be kept in only one of three broadgroups:

Psychrotrophs : optimum growth temperatures 20 to 30° capable of growth at temperature less than 7° C. Psychrotrophic organisms are specifically important in the spoilage of refrigerated dairy products. Mesophiles : optimum growth temperatures 30 to 40° C; do not grow at refrigeration temperatures.

Thermophiles: optimum growth between 55 and 65° C

It is very important to note that for each group, the growth rate increases because the temperature only increases to the optimum, after which it decreases rapidly.

Milk spoilage micro-organisms:
The microbial quality of raw milk is crucial for the production of quality dairy foods. Spoilage is a term used to describethe deterioration of a foods' texture, colour, odour or flavour to the point where it is unappetizing or unsuitable for human consumption.Microbial spoilage of food often involves the degradationof protein,carbohydrates, and fats by the microorganisms or their enzymes.In milk, the microorganisms that are principally involved in spoilage are psychrotrophic organisms. Most psychrotrophs are destroyed by pasteurization temperatures, however, some like Pseudomonas fluorescens, Pseudomonas fragi can produce proteolytic andlipolytic extracellular enzymes which are heat stable and capable of causing spoilage.Some species and strains of Bacillus, Clostridium, Cornebacterium, Arthrobacter, Lactobacillus, Microbacterium, Micrococcus, and Streptococcus can survive pasteurization and grow at refrigeration temperatures which can cause spoilage problem.

Types of micro-organisms and their activity in milk:
The numbered list below identifies seven types of bacteria according to how they change the properties of milk. Often these changes are negative (spoilage) but as we will see in later sections, many of these bacteria are important to the development of cheese flavour.Psychrotrophic refers to microorganisms which are able to grow at temperatures less than 7C. Cold milk storage and transport selects for psychrotrophic bacteria which are often proteolytic and lipolytic. Common psychrotrophic bacteria in milk are species of Micrococci, Bacilli, Staphyloccoci, Lactobacilli, Pseudomonas, and coliforms.

Pseudomonas species are the most common and typically have the most impact on quality. At temperatures of 2 - 4C, bacterial growth in milk is mainly due to strains of Pseudomonas flourescens. Little growth occurs at temperature less than 2C.Spore forming bacteria are able toexist in a highly stable form called 'spores'. In the spore state, these bacteria are able to withstand greater extremes of acidity, temperature and desiccation.Enzymes are biological catalysts that accelerate the rates of biochemical reactions. Bacterial enzymes are most significant to milk spoilage and cheese ripening but it is important to distinguish between the enzyme and the bacterial source.

For example, many psychrotrophic bacteria produce heat stable enzymes which remain active in milk and cheese even after the bacteria are killed by pasteurization.Keeping the above definitions in mind, notethe following types of microorganisms, grouped according to their impact on milk quality.

Lactic acid bacteria which ferment lactose to lactic acid and other end products. Lactic acid bacteria (LAB) important to cheese making will be described further in Cultures.As noted earlier, LAB are able to readily metabolize lactose so they have some competitive advantage over other microorganisms.Notwithstanding, their ability to metabolize lactose, LAB prefer temperatures greater than 30C, so, depending on initial relative counts, psychrotrophic bacteria including some coliform and pseudomonas bacteria are able to outgrow LAB at room temperature.

Proteolytic bacteria which degrade protein and cause bitternessand putrefaction. Most important in cheese milk are species of Pseudomonas which are psychrotrophic and produce heat stable lipases.Bacillus which form heat stable spores and survive pasteurization

Lipolytic bacteria which degrade fats and produce lipolytic rancidity. Again, the most common example in milk is the genus Pseudomonas. Several psychrotrophic species of Pseudomonas produceheat stable lipases as well as proteases.

Gas producing microorganisms which cause cheese openness, floating curd in cottage cheese, and gassy milk.Yeasts are always present in milk and are common contaminants during the cheese making process. They may cause 'yeast slits' in cheese and contribute to ripening of surface ripened cheese.

Coliform bacteria are always present in milk but their numbers can beminimized by good sanitation. Also, coliform bacteria compete poorly with lactic acid bacteria, so their numbers rapidly decrease in the presence of a rapidly growing lactic acid culture.Clostridium tyrobutyricum is a thermoduric (survives pasteurization) spore forming organism of legendary fame among cheese makers. C. tyrobutyricum causes gas formation (carbon dioxide) during the later stages of ripening of Swiss and Dutch type cheeses. The resulting craters and cracks in the cheese are called 'late gas defect'.

Ropy bacteria cause stringy milk due to excretion of gummy polysaccharides. Usually ropy bacteria such as Alcaligenes viscolactis are undesirable. However, in some fermented dairy products, ropy lactic acid bacteria such as certain subspecies of Lactococcus lactisare used to develop texture.

Sweet curdling bacteria produce rennet-like enzymes which may coagulate milk. Common examples are the psychrotrophic spore formersBacillus subtilis and Bacillus cereus.

Numerous off flavours have been associated with specific milkcontaminates.

Examples: -
Malty: S. lactis var maltigenes
Bitter: Proteolytic bacteria
Rancid: Lipolytic bacteria
Unclean: coliform bacteria
Fishy: Pseudomonas
Fruity: Pseudomonas

Types of milk products:-
1.Fermented milk. 2.Yogurt. 3.Cream. 4.Butter. 5.Cheese.6.Casein.7.Custard.

Classes of milk products:-
Class-1:- covers milk used for fluid, or beverage, milkproducts.
Class-2:- refers to milk going into 'soft' manufactured products such as sour cream, cottage cheese, ice cream, and yogurt.
Class-3:- takes in milk used for making hard cheeses.

The source of milk contamination:
The milk market requires and offers safe and high-quality products, preventing a contamination source by good hygiene practices to reduce a possible exposure of food-borne pathogens and chemical milk residues. The mammary gland participates in the excretion of numerous xenobiotic substances from veterinary drug milk residues and contaminants originated from milk and other chemical residues to environmental pollutants on the grasslands, animal feedstuffs, and the field crops.

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An indicator of milk quality in cow dairy farms the presence of residues concentration of milk contaminants and pathogens. Environmental pathogens, milk chemical residues,and antibiotics is obtained ,in evacuating the raw milk bulk tank at the dairy farms, quick information about under health status.

The relationship among dairy cow production and milk safety and dairy product quality is considered in different subjects: raw and pasteurized milk contamination and microbial aspects of the quality of milk and dairy products, cow husbandry in animal welfare influence, feeding conditions, and herd hygiene practices and milk composition. Also the

environmental pollutants, and chemicals from agriculture, pesticides residues, drug veterinary residues an management in Impact of storage conditions.

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Mammary gland health status	Cow herd health status	Production environment	Production land water source
S. aureus *Streptococcus agalactiae* *Streptococcus* spp. *Streptococcus pyogenes* *Streptococcus zooepidemicus* (B-hemolytic *Streptococcus* Lancefield C group) *Corynebacterium ulcerans*	*Mycobacterium bovis* *Mycobacterium avium* subsp. *paratuberculosis* *Brucella* ssp. *S. aureus* MRSA-LA *Salmonella typhimurium* phage type 561 (STM DT7)	*Listeria monocytogenes* *Salmonella ssp.* *E. coli O 157:H7* *E. coli (STEC)* *E. coli (EHEC)* *Yersinia enterocolitica* *Enterobacter sakazakii* *Campylobacter jejuni* *Enterococcus faecalis* *Citrobacter freundii* *Bacillus cereus* ± *Cryptosporidium parvum* *Coxiella burnetii** *Toxoplasma gondii**	Hepatitis A virus* *Leptospira* spp.* ±*Bacillus licheniformis* ±*Bacillus subtilis* ± *Pseudomonas aeruginosa* ±*Clostridium disporicum* *Aspergillus* spp. Aflatoxin M1 Mycotoxin B1

Cold storage:
It is important to understand the changes that can occur in the microbiology of raw milk during its storage and as a consequence of subsequent treatments. Milk is typically stored at refrigeration temperatures that reduce the growth of most bacteria, with the exception of psychrotolerant microorganisms that can proliferate under these conditions and become a major cause of milk.

Cold storage:
Raw milk during its storage and as a consequence of subsequent treatments, it is important to understand the changes tha can occur in the Microbiology. With the exception of psychrotolerant microorganisms that can proliferate under these conditions and become a major cause of milk, milk is typically stored at a refrigeration temperatures that reduce the growth of most bacteria.

This is primarily a consequence of the production of extracellular enzymes, with lipases and proteases being most important. These lipases degrade milk fat causing rancidity, while proteases degrade casein producing a grey colour and bitter off-flavours . Investigations into seasonal variations of microbial growth in raw milk have, unsurprisingly, established that psychrotolerant bacteria exhibit better growthand protease production in winter milk rather than in summer milk With lipase and proteases being most important,this is primarily a consequence of the production of extracellular enzyme. While proteases degrade casein production a grey colour and bitter off - flavous, these lipase degrade milk fat causing rancidity. Investigations into seasonal variations of microbial growth in raw milk have, unsurprisingly, established that psychrotolerant bacteria exhibit better growthand proteases production in winter milk rather than in summer milk.

Fat:
Milk and milk products also contain fat. Cow's milk contains fat that is in the form of glycerides. The fatin

cow's milk is a poor source of essential fatty acids.

Impact of storage conditions and downstream treatments on the microbiology Cow's milk contains fat that is in the form of the glycerides. Milk and milk products also contain fat impact of storage conditions and downstream treatments on the Microbiology, the fat in cow 's milk is a poor source of essential fatty acids.

Whole milk contains 3.9 g fat per 100 ml,
Semi-skimmed milk provides 1.7 g fat per 100 ml
Skim milk provides 0.2 g fat per 100 ml
1% milk, a blend of skimmed and semi-skimmed milk, has recently become available. It contains 1 g fator less per 100 ml.
Impact of storage conditions and downstream treatments on the microbiology of raw milk

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Impact of storage conditions and downstream treatments on the Microbiology of raw milk.

Technologically relevant bacteria of raw milk:
As described above, raw milk can contain a diverse bacterial population. Many such bacteria can contribute subsequently to natural fermentations. In some situations, specific strains have been so successful in this regard that they have been isolated from milk and consciously added as starters or adjuncts designed to confer desirable traits on fermented products

Raw milk can contain a diverse bacteria population,as described above. Contributie subsequently to natural fermentation, many such bacteria. Have been isolated from milk and consciously added as starters or adjuncts designed to confer desirable traits on fermented products, in some situations, specific strains have been so successful in this regard.

Protein:
Milk contains a number of different types of proteins, depending on what is required for sustaining the young of the particular species. These proteins increase the nutritional value of milk and other dairy products and provide certain characteristics utilized for many of the processing methods. A major milk protein is casein, which actually exists as a multisubunit protein complex dispersed throughout the fluidphase of milk.

Depending on what is required for sustaining the young of the particular species, milk contains a number of different types of proteins. Certain characteristics utilized for many of the processing methods, these proteins increase the nutritional value of the milk and Lactose.

Lactose is the principal carbohydrate found in milk. It is a disaccharide composed of one molecule each of the monosaccharides glucose and galactose.

Lactose is an important food source for several types of fermenting bacteria. The bacteria convert the lactose into lactic acid, and this process is the basis for several types of dairy products.

Glucose and galactose lactose is the principle carbohydrate found in milk. It is a disa composed of one molecule each of the monounsaturated glucose and galactose

The bacteria contain the lactose into lactic acid, this process is the basis for several types of dairyproducts. Lactose is an important food source for several types of fermentation bacteria Vitamins and minerals.

Milk is a good source of many vitamins. However, its vitamin C (ascorbic acid) content is easily destroyed by heating during pasteurization. Vitamin D is formed naturally in milk fat by ultraviolet irradiation but not in sufficient quantities to meet human nutritional needs. Beverage milk is commonly fortified with the fat-soluble vitamins A and D. In the United States the fortification of skim milk and low-fat milk with vitamin A is required by law.

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CONCLUSION:
Microbiology is study of different microorganisms like bacteria, viruses, parasites, molds, Yeast etc. New development in our understanding of microbial genetic they innhabit, create, or contaminate food and which have both beneficial and deleterious effects on the quality of food. It is a huge area that encompasses such disciplines as mathematics, microbiology, engineering, and chemistry. Food safety is a major

concern of food microbiology as well as a major challenge for global food sector.

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