Lab1

Food Technology practical Food

Technology: is. the branch of food science which deals with the actual production process to make foods.

•Early scientific research into food Technology food preservation.

• Nicolas apperts development in 1918 the Canning process was decisive event.

• a Louis Pasteurs research on avoid spoilage was the spoilage and how to early attempt to put food scientific basis.

Developments: Developments in food technology have contributed greatly to the food supply and have changed developments our world. Some of these are:

1. Instantiazed milk powder: it has become the basis for a variety of new product that are rehydratable. This process product by partially partially rehydrating spray-dried milk powder.

2. Freeze-drying: The. first application of freeze drying was most liKely in the pharmaceutical industry; however, successful large - scale industrial application of the process was the development of continuous freeze drying of coffee.

3. High- Temperature short time for the most part of these processing: are characterized by rapid heating short time at a relatively high processes and cooling, holding for temperature and filling aseptically into sterile containers.

   1.Decaffeination of coffee and Tea: Decaffeinated coffee and Tea was first developed a commercial basis on in Europe around 1900. Green Coffee beaus are treated with water, heat and solvents to remove the caffeine from the beans.

   2. Process optimization: Food Technology now production of foods to be more efficient, oil saving technologies now allows produce. now available different forms. Production methods are on and technology have als become increasingly sophisticated.

   Food is the transformation of cooked ingredients, processing: by physical forms, food chemical means in to food. or of food into other or poof ingredients to easily prepare combines raw processing produce marketable food products that can by processing typically involves and served the consumer. Food mincing and macerating, liquefaction, (such as boiling, boiling, frying or other Kinds of activities such as emulsification and cooking grilling); pick ling, pasteurization and preservation and canning many or other packaging. dicing, slicing, freezing or dry ing when processing such as leading to secondary products are Benefits of food processing: also included.

Benefits of food processing:

1. Toxin removal
2. Preservation
3. easing marketing and distribution tasks.
4. Increased food consistency.
5. It increases yearly availability of many food.
6. enables transportation of delicate perishable foods across long distances.
7. Makes many kinds of food safe to eat by de-activation spoilage and pathogenic M.O.

Lab2

Fermented Milk products (yoghurt) Milk products prepared by lactic acid fermentation (e.g yogurt) or a combination of this and yeast fermentation (e.g Kefir) are called fermented or cultured milks.

Yoghurt: is the best Known of all fermented milK products, and the most popular world wide, The consistence , flavor and aroma vary from the district to another.

•In some areas, yoghurt is produced in the form of highly viscous liquid, is typically classified as follows: Set type: incubated and cooled in the package. or in another type, So, yoghurt is typically Set type:

- Set type: incubated and cooled in the package.

(set yoghurt) ➡️1. Cup filler 2. Incubation room 3. Rapid cooling Room.

- Stirred type: incubated in talks and cooled before packing.

1. Incubation tank 2. Cooler 3 3. Cup filler

Drinking type: similar to stirred type, but the Coagulum is broKen down to a lipid before being packed.

Frozen type: Incubated in tanks and frozen like ice cream.

Concentrated: Incubated in tanks, concentrated and cooled before being packed. this type is some times called Greek yoghourt or strained yoghurt, sometimes labneh or labaneh.

Flavored Yoghurts: Some times yoghurt is also favorite with Fruits, vanilla, honey, coffee essences, etc. Coloring and Sugar in the form of sucrose, glucose or aspartame (a sugar free diet sweetener) are often added together, with the flavoring.
when necessary stabilizers may also be added to modify the consistency.
Milk for yoghurt production must:
1. Have a low bacteria count.
2. Not contain enzymes and chemical substances which May slow down the develop - ment of the yoghurt culture.
3.Not contain antibiotics and bacteriophage.

General Manufacturing Procedure
The following flow chart and discussion provide a general outline of the steps required for making yogurt.

General Yogurt Processing Steps Adjust Milk:
1-Adjust Milk Composition & Blend Ingredients
2- Pasteurize Milk
3-Homogenize
4-Cool Milk

5-Inoculate with Starter Cultures
6-Hold
7-Cool
8-Add Flavors & Fruit
9- Package

1/ Adjust Milk Composition & Blend Ingredients Milk composition may be adjusted to achieve the desired fat and solids content. Often dry milk is added to increase the amount of whey protein to provide a desirable texture. Ingredients such as stabilizers are added at this time.

2/ Pasteurize Milk The milk mixture is pasteurized at 185 ° F (85 ° C) for 30 minutes or at 203 ° F (95 ° C) for 10 minutes. A high heat treatment is used to denature the whey (serum) proteins. This allows the proteins to form a more stable gel, which prevents separation of the water during storage. The high heat treatment also further reduces the number of spoilage organisms in the milk to provide a better environment for the starter cultures to grow. Yogurt is pasteurized before the starter cultures are added to ensure that the cultures remain active in the yogurt after fermentation to act as probiotics; if the yogurt is pasteurized after fermentation the cultures will be inactivated.

3/ Homogenize The blend is homogenized (2000 to 2500 psi) to mix all ingredients thoroughly and improve yogurt consistency.

4/ Cool Milk The milk is cooled to 108 ° F (42 ° C) to bring the yogurt to the ideal growth temperature for the starter culture.

5/Inoculate with Starter Cultures The starter cultures are mixed into the cooled milk.

6/ Hold The milk is held at 108 ° F (42 ° C) until a pH 4.5 is reached. This allows the fermentation to progress to form a soft gel and the characteristic flavor of yogurt. This process can take several hours.

7/ Cool The yogurt is cooled to 7 ° C to stop the fermentation process.

8/ Add Fruit & Flavors Fruit and flavors are added at different steps depending on the type of yogurt. For set style yogurt The fruit is added in the bottom of the cup and then the inoculated yogurt is poured on top and the yogurt is fermented in the cup. For swiss style yogurt the fruit is blended with the fermented, cooled yogurt prior to packaging.

9/ Package The yogurt is pumped from the fermentation vat and packaged as desired.

Lab3:
Cheese Production
Introductions ETYMOLOGY w ord "cheese - latin 'casues meaning to ferment / become sour.

2_ Type of cheese;
Gorgonzola
cheddar
Requefort
Gouda
Grana
Gloucester
Stilton
Camembert

(3 Cheese : ultimately a milk product, widely used all over Purely product of microbial fermentation. flavor changes depending upon being used., Before long, people learned that and aroma the M.Os curds can be aged for over weeks and months and then pressed together to form large cakes of cheese., the art of cheese making have traveled from Asia to the Europe and then spread all over the world.
Ex: brie, Swiss cheese, camembert cheese, Roquefort, Grana Gloucester, Gouda ,Gorgonzola

cheese manufacture:
The manu facture of cheese involves the following:

• Pasteurization: 72 -73 Ĉ for 15-20 seconds. kills nearly all M.Os that cause disease. Clostridium tyrobutyricum and produce butyric acid and Hz gas by fermenting lactic acid.

Note: chemical Inhibitors can be used such as H20 can survive and Na NO3

• Bactofugation: process in which separate the bacteria and spores that present in milk. -Bacillus eg. cereus is reduced., 60-63 C is applied.

Micro filtration: A membrane filter with a pore size of approximately 0.2 micron can filter bacteria from a سطر مفقود reducing efficiency, micro filtration allows production of hard and semi - hard cheese without need for any chemicals to inhibit growth of Clostridia spores.

Additives oin cheese milk:
• essential: starter culture and the rennet
• certain conditions: calcium chloride and saltpeter
• Inhibitor of clostridia: lysozyme

🧿 Acid coagulation:
• Any soft cheeses are produced without of rennet , by coagulating milk with acid, such as citric acid or vinegar, or the lactic acid produced by soured milk.
• Cream cheese, paneer and rubing are traditionally mad this way.

🧿 Coaqulation of casein:
• pH is, rennet is added.

* Syneresis: or shrinking of the coagulum, it causes loss of whey and is accelerated by cutting, stirring Old cooking salting amount of acid and cheese making.

* Salting: it affects the texture and flavor of the final cheese by controlling microbial growth and enzyme actinity.

- Curd Monipulation: Heat treat ments: alters the composition and texture.

like sheddar and Mozzarella:

- Stretching the curd: the curd was immersed in hot About 8C), water and fluid mass of cheese was puled into strands to align the protein fibers and then poured into container to cool. ' such as

pasta filata and a also mozzarella

Washing: helps remove more loctose which changes the pH of the cheese.

Maturing : some cheeses are pressed in molds.

Maturing or Maturation or proteins: is the breakdown of Protein ,lipids and carbohydrates (acids and sugars) which releases flavor compounds and modifies cheese texture.

. * Packaging: in large blocks, porous bokes, ect. ripening:

Make the cheese in home

Milk. (1 liter) (Hall fut)

Bring the milk to a simmer just below a boil over medium - high heat.➡️ stir constantly to keep milk from scorching➡️ when it comes to a simmer reduce the heat medium➡️ Add 1 cup of white vinegar few at a time (limon or

lime' juice) stirr after each addition➡️ The milk will seperate into curds of whey➡️ Remove from heat, let sit for 1 5 min. to complete the separation process.➡️line a colaider with adouble layer of cheese cloth.➡️ This recipe can be scaled up or down➡️ press remove excess whey➡️ Let rest for 1 hour or until the cheese has reached your prefered texture➡️ The longer wait, the firmer it wll you get ➡️ After 1 hour.➡️ hard cheese➡️ So, Yummy, fresh and chewy this cheese wont last long.➡️ Can add salt, olive oil or any seasonings you like.➡️ you can crumble it, cube it and marinate i in olive oil➡️ Ricotta cheese, tet the curds strain for about 1 5 mimutes (Don't forget to sprinkle the curds with salt) Cream cheese: add salt and mix unil smeatl of areas .

LAB 4

Pickles,

The term pickle is derived from the Dutch (is a west Germanic language) word pekel, meaning brine. In most of world countries, the word pickle alone refers to a pickled cucumber except when it is used figuratively., other types of pickles will be described as pickled onion, pickled beets , etc.

Types of Pickles: 1. Gherkin 2. Brined pickles 3. Kosher dill 4. Polish and German 5. Hungarian 6. Romania 7. Lime 8. Cinammon pickles 9. Swedish and Danish

Brined pickles : are prepared using the traditional process of natural fermentation in a brine which makes them grow saur. the brine concentration can vary between 20 to more than 40 grams of salt per litre of water., there is no vinegar used in the brine of naturally fermented pickled cucumber.

Fermentation: The fermentation processes is dependent on Lactobacillus bacteria that naturally occur on the skin of growing cucumber. These may be removed during commercial highly harvesting and packing processes.

(1)

Nutrition:

1- contain a moderate amount of vitamin K.

2- offers 3 kilo calories., most of which come from carbohydrate 3- high is sodium, one pickled cucumber contain 350_500mg. 4- ability to act as vegetables with a high probiotic content. such as L. plantarum and L. brevis

Isolation of Lactobacillus after fermentation:

(2)

Sauerkraut: German pronunciation, is finally cut cabbage that has been fermented by various lactic acid bacteria., it has a long shelf -life and a distinctive sour flavor, both of which result from the lactic acid that forms when the bacteria ferment the sugars in the cabbage.

Note: The word "kraut" derived from this food , is a derogatory term for the German people., during World war I due to concern the American public would reject a product with a german name, American saure Kraut ma Kers relabeled their product as Liberty cabbage' for the duration of the war.

Cabbage fermentation: Sauvekraut is made by a process of pickling called lactic acid fermentation. That is analogous to how traditional (not_ heat treated) pickled cucumbers are made, the cabbage is finely shredded, Layered with sal , and left to ferment. Fully cured sauerkraut Keeps for several months in an airtight container stored at 15co below. Neither refrigeration nor pasteurization is required although these treatments prolong storage life.

(3)

The Microorganisms that can be found in saure Kraut:

after fermentation

1_ Lactobacilli is introduced naturally, as these air-borne . bacteria culture on raw cabbage leaves where they grow.

2_Yeasts also are present, and may yield soft sauerkraut of poor flavor when the fermentation temperature is too high.
3_First phase of Fermentation (naturally); anaerobic bacteria
such as Enterobacter lead to fermentation., and begin produced an acidic environment that flavors later bacteria,
4_Second phase starts as the acid levels become too high
for many bacteria, and Leuconostoc mesenteroides and other leuconostoc spp. take dominance.,
5_Third phase : various Lactobacillus species, including L. brevi and L. plantarum , ferment any remaining sugars , further
lowering the pH.
[these 3 phases in Fermentation process, collectivelly sometimes
reffered to as population dynamics.]
Note Properly cured saure kraut is sufficiently acidic to
prevent a favorable environment for the growth of Clostridium botulinum, the toxins of which cause botulism.
(4)

The genomic study found an unexpectedly large
diversity of Lactic acid bacterice in saure Kraut, Weissella was found to be a major organism in the initial,
hetero fermentative stage , up to day 7. It was also found
Pediococcus pentosaceus had smaller population numbers in first 14 days
, The benefits:
1) Source of wit. B, C, and k.
2 high in calcium and magnesium.
3_very good soure of dietary fiber, iron, copper
4_ Supply of probioties improve digestion and promote
the growth of healthy bowel flora, protecting against many disease.
5/ is a time honored folk remedy for canker sores.
6/ Inhibit the growth of cancer cells because it has key detoxifying enzymes of and was it's Ch

emopreventive activity 7_is high in the lutein and Zeaxathin (antioxidant)
both associated with preserving ocular health.
Fermentation and Isolation ; as the same as in Pickles.
(5)

LAB5

Food Technology - Wine production: Introduction:
• Wine is an alcoholic beverage made from
fermented fruit juice.
• Grape wine is produced by fermenting crushed
grapes using various types of yeast.

Types of wines:
1. Red wine
2. white wine.
classification of wines:
1 Sparking wine
4 Fortified wine.
2 Desert wine
5 Table wine.
3 Ice wine
Wine Production
Main steps
1. Vit culture
to pressing 2. Harvesting
7. Mixing 3. Stemming
8. Clarification 4. Fermentation 5. Draining
10. Bottarling
9. Aging
(1)

1. Vitculture:
Factors which influence grapes flavor:
Climate (sun, humidity and others)
•Soil quality
2. Harvesting:
• Grappes are picked up by hand or mechanically,
• Descision of harvest informed by level of sugar
and acid.
3. Stemming / Crushing:
stemming is the separation of the stems and grapes (which are sends to the press) Crushing: A horizontal press squeezes the broken grapes, separating the fresh juice (must) from the skins (marc).
4. Fermentation Sugar and acids that naturally
react with wild yeasts, fermentation can take from 10 to 30 days to convert natural sugar to alcohol.
5. Draining: Liquid wine is drained from the vat without being pressed and go into barrels (free-run ing pressed and go, in t
wine wine), the remaining pulp retains about 20% of the wine
(2).

6. Pressing: The remaing pulp, after draining
is pressed to squeeze out the press wine.
7. Mixing: The free run wine and press wine, always from the same source, are mixed together in appropriate ratios to obtains the desired balance.
8. clarification: done in numerous ways: . 1. Fining 2. Filtration 3. Siphoning

4. Floatation
9. Aging the clarified wine is transferred into either wooden barrels or metal vats to mature the wine
and develop flavors.
10. Bottleing: A dose of Sulfite is added to help
preserve the wine and prevent un wanted fermentation
in the bottle. Note Saccharomyces cerevisiae has been favored due
to its predictable and vigorous fermentation capábilities, to lelance of relatively high levels of alcohol and Sulfur doxide as well as its ability to thrive in normal wine pH between 2.8 and 4.
(3)

Yeasts: Yeasts are naturally occuring micro-organisms which are essential in the fermentation process. Yeasts attach themselves to the bloom on the grape skins : wild yeasts and wine yeasts are two types and basic groups of yeasts presents on the skins. Wild yeasts (mostly of the genus Klockera and Hanseniaspora , need air in which to operate, Once in contact with the grape sugars, they can convert these sugars to alcohol, but only up to about 4% alcohol by volume, at which point they die. Wine yeasts of the genus Saccharomyces, then take over and continue to work until either there is no more sugar left or an alcoholic strength of approximately 15 % has been reached, at which point they die naturally.
Note. Saccharomyces bayanus is tolerate alcohol levels 17 -20% , so it's often used in fortified wine production
such as ports and varieties such as Zinfandel and Syrah harvested at high brix sugar levels.
Complexity
• Brettanomyces: is presence in wine fault or added note of comlexity
(4)

Lab. 6

beer production:

Essential Ingredients of Beer:
1**.** Malted Barley 2_Hops 3. Yeast 4-Water
5. Nof required , but frequently found Ingredient. 6. Starch adjuncts (corn and rice starches)

Yeast: Yeast be found naturally on the can surface of most plants including barley seeds.
* Wild" yeast will most likely produce flavors that are undesirable.

Sacchavomyces cerevisiae is the species most often used for ales , its optimum fermentation temperature is 16-24 c.

Suchacomycas uvarium is largely used in lagers , and steam beers, the optimem temperature for this fermentation is 2-13c

what qualities shauld yeast have ?
1. Rapid initiation of fermentation.
2. High fermentation efficiency.
3. High ethanol tolerance
4. Desived flavor characteristics.
5. High genetie stabikty
6. Range of alcohol preduct.

Raw materials:

Malt: is one of the main ingredients and is obtained from barley, which is subjected to process of germination under controlled conditions., this operation caled (malting).

Corn: is very commen, the oils are extracted, then it is milled and called grits.
Barley: rice or wheat may also be used.

Humulus lupulus (hops): hops are the flowering portion of the hop vine., these flowers not onlly fightt off bacterial infections in the beer, they aid in clarificalion of the beer, stabilize the flavor, help retain head, and aid in ones ability to drink the beer.

Production process : The first phase in the process of beer production is the preparation of the wort (8-14% total solids, 90-92% are carbohydrate: glucose, maltotriose and fructose, vitamines: biotin, inositol, pantothenic, nitrogenous compounds).

wort preparation has foor stages:
1. Milling. 2. Mashing 3. Filtration of the wort 4. Boiling the wort

Milling: In order for the melt components to be rapidly extracted and converted the malt is milled to obtain coars flour.

Mashing: The flour from the cereals is mixed with water. These conditions encourage the development of complex starch molecules and proteins.

Filtration of the wort: it is done to seperate the spent grains from the wort itself.

Boiling the wort: the filtered wort is boiled for 2 hours. The purpose of boiling is to:
- Transform and make soluble the bitter substances in the hops.
- Sterilise the wort.
- Establish the final concentration of wort
- Eliminate undesirable volatile substances.
- Provoke the precipitation of poteins of high molecular weight.

Fermentation / Moturation

Fermentation: The wort sugars are converted by transformation of yeast into alcohol and carbon dioside.

Maturation: The period in which the beer is allowed to rest at suitable temperatures in order for the undesirable valatile.

stabilisation: This consists of letting the beer stabilise at temperatures of between 24-30c.

clarification: is the operation that gives the beer it's clear limpid , quality, eliminating the last remnining traces of Clouding still in suspension.

Transfering: The final stage of beer production, process is transferring the beer into different Kinds of containers (bottoles , barrek , cans ete).

Note Type of beer depend on the type of used yeasts in production process.

Lab.7

BaKer's Yeast Production:

It is one of the largest profit grossing industry.Since demand is directly associated with bread demand and there is an ever increasing demand for bread.

• Marketed in the form of cake, powder are not required so…. Directed towards max. biomass production.

•**Saccharomyces cerevisiae** is the most commonly used, unicellular, rich in protein and vit. B., Budding and has enzymes :- Maltase : converts maltose to glucose. Invertase: converts sucrose→ glucose maltose to + fructose and Zymase complex : converts sugars to Co2 &ethanol.

Yest production:

•Pure Culture: S. cerevisiae

•Media: sugars (Molasses)

Nitrogen (Urea , NH3 salts or NH3)

phosphorus (phosphoric acid)

Trace elements (Magnesium ,iron, calcinm, Zinc)

S. cerevisiae

⬇️

Media

⬇️

incubated for 2-4 days in flask

⬇️

Transferred to a large vessel (16-241)hr.

⬇️

Tranferred to intermediate fermenter. (1)

⬇️

Yeast separated through contrifugation (2)

1) Duration of final trade fermentation is about 19- 22 hrs., the yeast cells increase in number 5-18 fold., PH 4.5-5.5 and nutrient, and airflow must are monitored carefully . Temperature is Kept in 85F.
2) A- yeast is separated and washed with water and re - centrifugated to yield cream yeast
   B- cream is pumped to rotary vaccum filter or plate fram filter and dewatered (Solid contert vaccum 30 - 32%. After this 2 types of Baker's yeast is obtained.

Types of Baker's yeast

1) Cream Yeast: is charachteri zed by :
   • Suspension of yeast cells.
   •Cream yeast in not termed as baKer's yeast but is a marketable product.
   • Solid contents about 18 – 20
   2) Compressed yeast :
   Most of the moisture is removed and dried by passing through fluid - bed drier.
   •Emulsifiers and oils are added to texturize and aid in cutting process.
   • Solid contents range between 27-33%
   •Shelf life of compressed yeast is about 1–2yours.
   • compressed yeast can be A form or B as follows:

A) Granular Yeast
• Small granules
• High age of live cells
• Can be added to driest doughs
• Small amount of ascrobic acid added as preserevative.

B) Cake Yeast
• Also known as active dry yeast.
• Long shelf life
• Cells encapsulated in a thick jacket of dead cells
• More sensitive.

Yeast Testing:

- strain purity and trueness to type is tested.
- Strict adherence to GMP rules is required.
- Complete microbilogicall testing.
- Tested for gassing activity
- pH.
- Gm/ltr of yeast.

Application:

- production of Co2 (cause expansion of Dough).
- Dough maturation (Result in light dry “leavening agent “physical structre).
- Development of flavour (characteristic flavor bread)

<u>Yeast production stages</u>

Vial 0.00001 (Pounds of yeast at 3% solids)

⬇️

flask 0.1

⬇️

pure culture 2.000

⬇️

seed 20. 000

⬇️

semi-solid 80. 000

⬇️

Production 50.000