

Dairy and Food Process & Products Technology
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Lecture - 01
Preamble of the Subject

Good morning, today we are doing our first class on Dairy and Food Process and Products Technology, right. Now, from the name itself, food is a very vast subject. If you go to the history, then you will see that in couple of decades back this was originally clubbed with chemical engineering. Now, after that when people used to know more about food, then they thought that; let this food be segregated/separated from chemical, because chemical itself is a big and that was also expanding.

So, from the umbrella of chemical engineering, this food has come out. Now after the several decades, food also has been expanded and I do not say that tomorrow food will be disintegrated to some other areas, but yes associated many things are also there like microbiology, that is altogether a separate subject, then your processing itself that comes under both mechanical chemical in many many places so depending on what you are handling, what you are doing your course umbrella is accordingly selected.

Then the question comes very first that where to start and where to end; obviously, because what we will do? In every courses, the same preamble is not liked by you, many of you may undergo different courses or similar courses, then it becomes monotony for you, that is why there are something to start with. Since, under this MOOC this type of course, is the first time you have registered yourself, that time you have seen the course content, course material, I will also show you a once again here.

There, I have not given any prerequisite. The reason being that if you want to start something; where you start. If you start writing a sentence, if you start learning from A, B then there will be no end.

Your objective is to write the sentence. So, it is supposed that you know A, B etcetera how to write, and then you know the meaning of the sentence the expression of the sentence, then only you can write. Here also we would like to bring a some preliminary things for your understanding so that in the long run when the course is almost halfway

or almost to the end, you do not have the problem that these were not known; these were to be told etcetera.

So, some preliminary things are definitely I will try to describe. Then it comes, why should we take this course?, what is the objective, what is the purpose. If you did not take the or register in this course; what do you would have lost? that is the fundamental question coming that if I do not take, then fine I do not lose anything. But if I take, I gain what? that I should know before had, right.

So, here it is dairy and food and in this I would like to mention here itself, that normally we segregate food in two parts, one is the solid or semisolid food, another is the liquid or semi liquid food, right. Obviously, both cannot be under the same umbrella, like if many of your friends are sitting together and watching, this class, then it cannot be thus all of you have the identical shirt or pant or similar kind of thing.

So, that it fits everybody equally or into the same extent to the same level of accuracy. So, in that case, definitely you have to make it according to your requirement, according to your choice, according to your liking. All these will dictate which shirt; which pant you will wear, and which will be by your friends, right.

So, in that case, we can say that we divide food into two parts, one in the liquid food and another in the solid food. And another thing which is also in the course, in the headline itself; means course or topic itself, the subject/topic itself it is there, that process is there right. So, when we are talking about process, and when we are talking about products, they are all again all together different.

Yes, it is through process we arrive at the product, right. And that is where we are, then in the question comes, why should we do the processing? If we do not do the processing how does it matter? let it be like that. I will give a small example, which you come across every day, right.

At your home, you ask your mother; you ask your parents or senior people, senior persons who handles it every day, that they buy milk every day. More or less every houses milk is one of the product, which we consume, right; now, when the milkman has given or if you have bought from the market pouches whatever now nowadays commercially available.

In earlier days these were in bottles, do with with the advent of time with the advent of technologies things are getting changed. So, there was when bottles where there some good things where there similarly bad things was that it they were breakable so, handling was problem. So, the manufacturer then changed it to polythene.

Again, someday it will come that this is not suitable or some problem or natural hazard or some other. So, then again it will be shifted to some other, right. It is changing it cannot be steady, that universal all through it will be identical if there cannot be such kind of things. Then this once you process and then you get the product; that means, you must know also the processing, you must also know to the products, right.

So, until and unless these things you know, this is a small ambient in the entire domain of the food, right. It is very, very small part in the entire domain of food in one subject everything cannot be taught, in the earlier classes also not only in my class, I am referring to your earlier class when you were in schools, it was not possible that all the things may be yeah! whether it is English or Mathematics or Physics, everything would be told in one year or one class if like that, right.

So, the purpose of this course is to make you aware that what you should consider as safe product, what you should consider as palatable product, how you will keep these products, how will process these products?, and how long you can keep it? That is a fundamental question. That's how long I can keep it? I gave this example of milk, and this milk if they were not processing in after they brought it is from the market, or the milk man supplied since there, then now it is summer in many process.

So, typically where it is peak summer, this problem is more severe that the milk gets curdled milk gets spoiled, right. In spite of your best wishes, you could not manage to stop that, unless you have taken due care of processing. What processing did you do there? Or did they do there? They have taken it to a pan and then heated it, right.

And it is not that, once you heat and that is for all. you ask your mummy that once she has boiled it in the morning in the summer, peak summer if it is not kept in the refrigerator or somewhere in cold ambience, then in the night if it is peak summer, I am again referring; that means, outside temperature is very high may be 40 or 45°C somewhere it goes to even 50 °C. So, there in the morning it was boiled, and in the

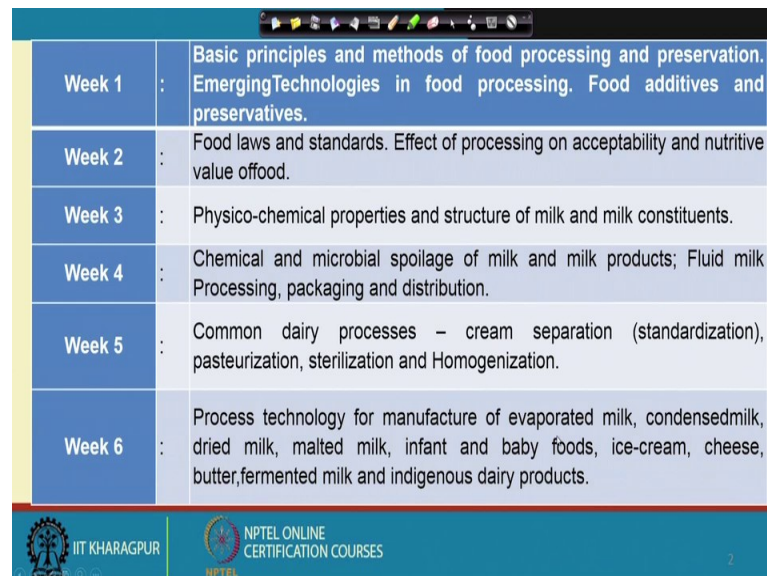
evening the same thing may happened the milk might have gone rotten or might have been spoiled. It is not acceptable for your consumption.

That means, it is not that you have processed once, and that is for that is once processing is for lifetime, no. So, everything has certain plus or certain minus; that means, some insight we have to come to know, then only you will be able to detect, then you will able to understand what kind of processing, what kind of things we will be doing, right.

Since, I have taken this typical one, as I was told that the students should come to know that why should they take the course, right. Before end unless you are your compelled to take the course, you will not, but if you love the course, definitely you will have lot of interest to know more and more, right.

So, to create that interest in you, I take this class as the platform, where I tell in this in this typical course, let me go to the next.

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Week 1	:	Basic principles and methods of food processing and preservation. Emerging Technologies in food processing. Food additives and preservatives.
Week 2	:	Food laws and standards. Effect of processing on acceptability and nutritive value of food.
Week 3	:	Physico-chemical properties and structure of milk and milk constituents.
Week 4	:	Chemical and microbial spoilage of milk and milk products; Fluid milk Processing, packaging and distribution.
Week 5	:	Common dairy processes – cream separation (standardization), pasteurization, sterilization and Homogenization.
Week 6	:	Process technology for manufacture of evaporated milk, condensed milk, dried milk, malted milk, infant and baby foods, ice-cream, cheese, butter, fermented milk and indigenous dairy products.

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You have seen in your course outline when you registered; obviously, you have seen. So, lot of things and some basic principles were told. Some basic principles are there, some laws are also there, some physical or chemical changes during processing or structure of the material, how they are that is also there.

Then why we as I said that milk example, why it got spoiled, right. That also should be known, otherwise why should you learn that if you cannot tell your mummy, that

mummy do not keep it outside for such a long time, right. Do not keep it outside for such a long time, and one more thing I tell you it is not only for food, right. It is now a days it is for any whether it is prepared food or you brought it from outside, nowadays lot of ready to eat foods are available all over, right.

Or processed foods are also available all over, but any food it is recommended that this heating business unless, unless it is not to be heated like ice cream is a product which you cannot heat, right. It has to be consumed in the cold only, because if you heat the ice cream it will melt, and you will not get the, you may get a little taste. You will not get also because ice cream as it is cream as well as air both are there, right; both together.

So, unless you have both together you do not enjoy it, you do not get the feel of it. So, to have that feeling, you have to have in the cold ice cream. So, that is not again the example of this milk we are coming back.

That what are the microbial changes, what are the things which are responsible for, spoiling the milk, which mummy had boiled in the morning. But in the evening when you came back after the classes after, after the day's play and everything, and if mummy wanted to give you back , that part of that milk she saw; that it got spoiled. So, you must be able to tell her, that mummy you should not have done this right.

So, you learn a lot from your home also, it is not home science, but basic science, science is, right from your home and whenever you are able to convert it into commercial level, then it comes to the level of engineering. So, science when it is applied, when this made to commercial level, then it comes the engineering, because then you have to tell, because mummy had done it in a small pan of maybe 1 litre, 2 litre.

But you assume you see that you have become a owner of say 1 lakh litre of milk a day. Then obviously, that 1 litre, 2 litre, 10 litre pans will not help you. Maybe the processes is same that, what mummy had done; you will also be doing. However, you need to know now, how to handle such a huge quantity of the raw milk or basic liquid milk right. Therefore, these things we must be aware of and some more like common dairy processes like separation of cream.

You take everyday butter; know bread, butter, jam, jelly and marmalade the things you take. Every day I am not saying everything will come under this under the purview of

this course, but as a preamble, we can say that when you are taking jam, jelly and marmalade in the bread as well you are taking butter in the bread. Butter is a milk product whereas, jam, jelly they are not milk product, right. Milk which we referred that was spoiled because of the outside temperature being, so high summer peak summer right.

But butter you do not keep it outside, because butter at room temperature it is solid, but if the room temperature means around 20 to 30°C , if it is beyond that then it is start melting,. So, it loses it is solidity and comes to liquid.

Then it will be very difficult for you to keep it. So, you must know which one to be kept where, for how long it will stay etcetera. So, these things if you do not know before, then you will not be able to make the commercial processing successful. You will not be able to understand how, where and what you are doing right.

So, this course will help you to understand lot of both microbiology, physical science, chemical science and some processing, some laws, food laws by which because. I do not know whether you have seen you are aware of regular I mean this media. Media in many cases many places it is being shown that artificial milk is also being prepared. And that to in almost in the very high scale of level, right.

So, those milk are not eatable or drinkable, right. Those milk are not drinkable, it should not be, it is harder in some big big stations that a tea which have been served, they are made from the milk which has no quantity not a single drop of natural milk, entire thing is manufactured. So, those are you must be able also identify and tell that this is the law you cannot do this, right. You can fool people, there is word there is a saying, that you can fool all the people once, you can fool some people for many times, but you cannot fool all the people all the time, right.

So, the you may be one of them that who will tell no you are not suppose to do, because this is we have come to know that these are the laws, these are the statutory laws where you will come to know that, if you are caught if you are found to do such unfair means, then you will be penalized, you may be sent to jail. So, these things you must know and then you must understand, you must know, then only you can convince that this is bad and that is good, right.

Some process technology for manufacturing of some of the products like evaporated milk condensed milk, you have come to come across at home also that many milk products every now and then milk products are at home coming every other day you may have some or other kind of thing.

But earlier in our childhood since that time the production of milk might not have been so, high as it is, right. Kurien Saheb as you have come to know that Kurien, he had made that Gujarat this Amul cooperative, then only that was a white revolution, right. And lot of milk was made available to people right, but yes during our childhood that kind of milk was not available, and market milk like this today available every almost in every other shop.

So, there it was not that maybe some places from where it would have come; you have to go and stand in the queue, and you might get or you might not get some quantity. So, the alternative was condensed milk. Still we remember that condensed milk. It is Yeah, very palatable when you take it, but; obviously, seniors will not allow you to take just directly, because from that condensed milk you can make normal milk in a bigger way, or you can use them for some other purpose, right.

Some dried milk, some melted milk, some infant baby food, ice cream cheese butter fermented milk, indigenous dairy products, these are some of the products which we will be dealing in this course also.

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Week 7	:	Methods and procedures for sampling and testing of milk and milk products. Laws and standards for milk and milk products.
Week 8	:	Technological processes for industrially manufactured foods of commercial importance, from plant and animal origin.
Week 9	:	Cereals, vegetables, fruits, meats, poultry and egg products; Bakery, pasta and confectionary products, ready to eat foods, fermented foods, alcoholic and non-alcoholic Beverages, tea, coffee and cocoa, fabricated foods.
Week 10	:	Packaging materials; Characteristics, properties and their design. Packaging requirement for Different processed and unprocessed foods.
Week 11	:	Working Principles of various type of fillers : form-fill-seal machine.
Week 12	:	Gas packaging and modified atmosphere Package design. Shelf life prediction of foods in packages. Quality control in Food packaging. Product safety and packaging regulations.

Then we will also look into some methods, a procedures that how you will be sampling. I still remember that when I was in commercial industry; say, ice cream there every day the milk used to come in big big tanks, maybe 25 litres or 50 litres tank capacity from different parts, right.

And those people, I was of course, not directly in the associated with that. But those who were in the in the in the quality control so, they used to attend those, and they have to decide on the platform, on the on the place where it was used maybe 100s of the such tanks have come and they have to tell yes these are all or some of them are bad.

Now, imagine without any virtually, without any help of any instruments, is it possible for you to tell yes this is bad that is good. But any instrument if you use that will take some time, but you have to decide almost within. So, when they are coming they are coming in bulk. So, 100's of cans are coming in line and you have to decide at that it will go inside to the industry, or it will be thrown out the supplier will take it back because of bad milk.

So, this decision those quality control people have to take so, how to do? So, there must be some with those are called platform test. So, those are also to be known, then some technological processes for industrial manufacture of foods of commercial importance from plant and animal origin, right. May be subsequently we will start when the regular course after the preamble. Then we will see that as I said we divide food in two parts, primarily as liquid food or as solid food. And then also in the solid food, we tell either it is from animal origin or from the plant origin, right.

So, again you are making two umbrellas; One from plant origin, another from animal origin. So, unless you know them, you will not be able to decide what to do or not to do. Then out of the plant origin, it could be cereals, pulses, fruits & vegetables or animal origin may be fish meat like that, right.

Then once you are with all these materials, then the it comes how will you keep it. Yes, at home mummy has kept it in a small container and may be kept in the refrigerator. Nowadays majority of the people do have refrigerator at home, right. Most of the people who can afford of course, it is also has it has to be affordable.

So, those who can afford do have also refrigerator. So, mummy has take kept it in the refrigerator in a small quantity. But if you have to do it in a large scale, may be in intense of thousands of kgs or litres, then how to store them, or in small quantity also you have to shift it from your place you have the processing place at your place to may be 1000 kms have a from there, how to keep it? How to send it? How to store it?

So, these are to be known. So, we are coming to packaging material, some properties of the packaging material, some principles for filling shorting all these machines, then whether it is gas packaging or atmospheric packaging. All these will come up and definitely will take care in the due course of the proceeding of the course, right. I simply request you that please make sure that you are going through the course regularly, and whatever questions you will have you will be free to ask us through some portal that will be given to you. And there will be every week there will be some questionnaire and you have to answer them, and try to answer them yourself, right.

Without taking the help of books and other helps yourself from your good self you can reply them then obviously that becomes good thing and you can then be sure, yes, I have learnt a little, ok; so hoping you all the best. So, let us conclude our preamble today here itself, next class onwards we will be proceeding towards the main course of this subject.

Thank you.