Dairy and Food Process & Products Technology
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Lecture - 03
Nutritional Value of the Nutrient

So we have come to know what is food, but this is the basic you every time we will show you that courses Dairy and Food Process and Products Technology right. So from there we have come to know the basics of food the basics of nutrients right. Now we go that we have taken this fat, protein, carbohydrates, vitamins, minerals and water right.

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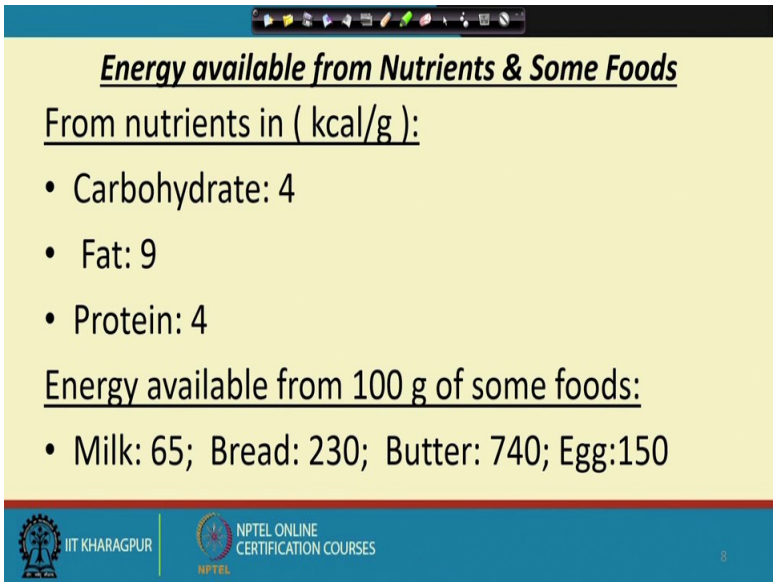

What is such that in your house you may be say a fat; your sister brother could be a protein, another mummy daddy could be carbohydrate or some other thing the they are considered like that the basic requirements, basic necessity right, but unless you have a house they have no meaning. Similarly it is that these nutrients that fat protein carbohydrate, vitamin, minerals, unless water is also there it has no completion of the cycle.

So water has to be given due respect due position and due appreciation for it is purpose of taking it right. So when we have taken this fat protein carbohydrate then it can be said that it helps you to maintain your body, it helps you to for your growth it is sustenance everything, you see when you were child you were maybe 1 feet in height, now you are 5

feet 6 feet in height. So you have grown up from that small to this big how and every stage this was helped by the food only; there is no other thing by which it was right.

Now you had played you had done many many things you were doing this and that we I am talking, you are talking, you are watching, where from the energy is coming? These energies are all supplied by the food, then it comes the question who is contributing how much? Right, fat is contributing now of course all engineering, all sciences are according to the units are according to the SI unit right.

So that SI unit is in energy terms in joules and others, but if we tell in that then it may be some decimal numbers say 5.2 or 8.9 like that it is very difficult to remember for that even today at least we do use though at MKS system, till for this energy to be explained or said fat gives 1g of fat it gives 9 kcal, 1 g of fat gives 9 kcal, carbohydrate gives 4 kcal and protein gives also 4 kcal right.

So carbohydrate and protein they are 4 kcal/g, if you consume per gram fat you will get 9 kcal. So it is more than double what you gain energy from fat than that of the carbohydrate or protein right. So that is why the food which is rich in carbohydrate or more parts in carbohydrate availability, that will give you one kind of energy, or the one which has high fat that will give you another kind of energy or someone which is having high protein that will give you another right of course in energy terms we have just said that protein and carbohydrate do have the same number 4, but fat has 9 per gram and the unit is kilo calorie, keep it mind normally you do the mistake that 1 gram and kilo calorie right.

So of course you can converted into SI in joules or kilo joules as when you need, but this 9 is easy to remember, 4 is easy to remember right. So if you convert them in SI unit then it will be some decimal number which is not easy to remember right. So that is why still we call 9 fat 4 carbohydrate 4 protein. So let us look into different food items which gives what energy right, milk gives per 100 gram of milk gives 65 kilo calories, bread gives 230 kilo calories, butter gives 740 kilo calories and egg gives 150 kilo calories. Now from these numbers is it not imaginable or is it not calculable that milk does not possess much fat because it is giving only 65, right

So fat, protein and carbohydrate if it sum up together then the energy total 17 kilo calorie per gram right. So from100 gram we are getting 65 only. So it is almost 3 or 4 kcal/g we

are getting from the milk that should contain like that fat, protein and carbohydrate in that range similarly bread is giving around and 230 kcal per 100 grams right. So it should have sufficient quantity of fat, but it is not so it is lot of carbohydrate as we have seen in the previous in the previous class we had shown you that: what are the components which are available in bread as well as in milk know.

So there you have seen that bread contains around 50 % carbohydrates right, and some quantity of little fat little protein are also there. So that is why around to 30. Butter is basically fat around to 83 % is fat, and some around 17 % is 15 to 17 percent is moisture or water and where out 2 to 3 % salt. Generally you will see that fat butter when you taste it is salty you do not have to add externally normally some salt for the butter, but yes if it is cream there is no salt right.

So butter contains salt, water, as well as fat around 83 % fat so that is why it is giving such a huge energy around 740 kcal/100g right, whereas egg is taht it has if you see the composition of egg in terms of fat, protein and carbohydrate you will see they are not very high right, fat is also moderate protein is also moderate carbohydrate is low. So in that case it is somewhere in between around 150 right.

So this tells that depending on your source of the food, depending on your intake of the food, depending on your type of the food, you are generating energy to the different levels right, in the previous class if you remember I said balance diet all the time right again this balance diet is not part of the course you will not see anywhere, but as I said during the very beginning that it is not also possible to encompass a class within this kind of frame work, because there are many associated things come in where if it is the then not told then it becomes vacant and that part should be known, that is why time and again when this kind of situation will arise will try as much as information you can disseminate to you.

So that balance diet will help you in what way that this energy balance according to the requirement, because it is not only the energy which your body needs body needs to build your body as I gave the example that from the from the child or from the infant stage, when you were 1 feet height now you have become 5-6 feet height, and such a huge growth from maybe 5-6 kg to now 60-70 kg. So that huge growth where from it came from the food and lot of it went into yes your daily activities as well growth of

your body that weight that building up of the body. So protein and also your body structure like the bones and others so they need this and all the food supply these need right, and different food as we have just seen that they supply different kinds of energy, different kinds different terms of fat content, protein content, carbohydrate content.

So, we must take some as the body is required and there are other courses where these are more or less in detailed studied or in detailed told, which this is not possible for it because there is there is you will see that that there some common terms are also there right common terms are also there by which your dieticians they do they do finalize they do tell you that how much what you will consume right. So they will that is another all altogether all together right.

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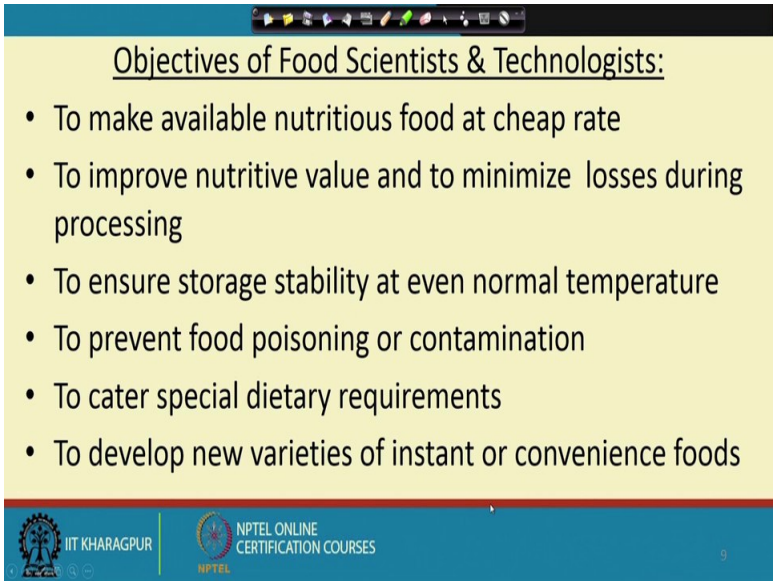

Now objective what should be your objective after studying that you must make available nutritious food as cheap as possible must improve nutritive value and to minimize the loss during processing again I give here 1 example that you have come across every day; your mummy; your seniors when they are say processing milk that is the most easy or rice or say wheat right when they are preparing during the process of preparing right from the raw material to the finish product whether it is rice, whether it is chapathi, or whether it is milk, if you have if the she has taken 100 grams or 1 liter of milk, or 100 kg 100 grams of rice, or 100 grams of wheat, the finished product he got

never equivalent to 100 right, some were lost in the milk you will see some at the bottom of the container is associated which you cannot take out.

So that is the lost but this we cannot avoid this we cannot avoid what you can do? You can minimize that is why when milk was being supplied to you; mummy had done taken some spoon and scratch all these containers so that as much as comes out right. So you being the engineer or scientist you will be this will be your responsibility that how minimum loss during processing you can attempt right. Then to ensure the storage ability at even normal temperature I gave earlier also some example that milk you are keeping at in the refrigerator right. Now that is avoidable with this such a product, but again I tell you milk if it is pasteurized, then only it is kept in the refrigerator, but if it is sterilized then it is not kept in the refrigerator you go to the market ask for sterilized milk you will be given in some packaging material and you will see that that was not kept in the refrigerator, that was in open atmosphere, though milk is so much susceptible right.

So this is 1 example. So it is coming to you that you must make that additional cost to be minimum that you have to keep it at low temperature or some refrigeration or some other so that at room temperature if you can keep as much that is your objective or your goal it should be, then to prevent food poisoning or contamination. In every other day you will see through news through news papers that from these area or from that area by taking this food etcetera etcetera some or other kind of mishaps had been happening, or still happening right. Why it because either the food was contaminated or the food was poisoned or spoiled and after that it got poisoned and because of that this mishaps did come up.

So your objective should be that you should minimize this poisoning or contamination as far as practicable right, then to cater special dietary requirement somebody may need high carbohydrate and low protein somebody may need high protein and low carbohydrate minimum fat right. So depending on the requirement your supply also has to be accordingly, so you have to cater, you have to make food in that aspect, in that way such that you can cater as the requirement is coming. Then, to develop new varieties of instant and convenient foods nowadays people are so much busy all over all over people are so much busy that they do not get sufficient time to process or to cook or to make their food everyday; prepare their food every day.

So if you can manage to supply that either precooked or semi cooked or almost cooked half cooked things like that so that the consumer will have minimum time requirement for processing them, then your invention your intervention into the system everything will be fruitful. So you one of your goal also should make should be that you can make convenient food such that conveniently people can consume as and when if they are requiring it right, this could be your goal then we come.

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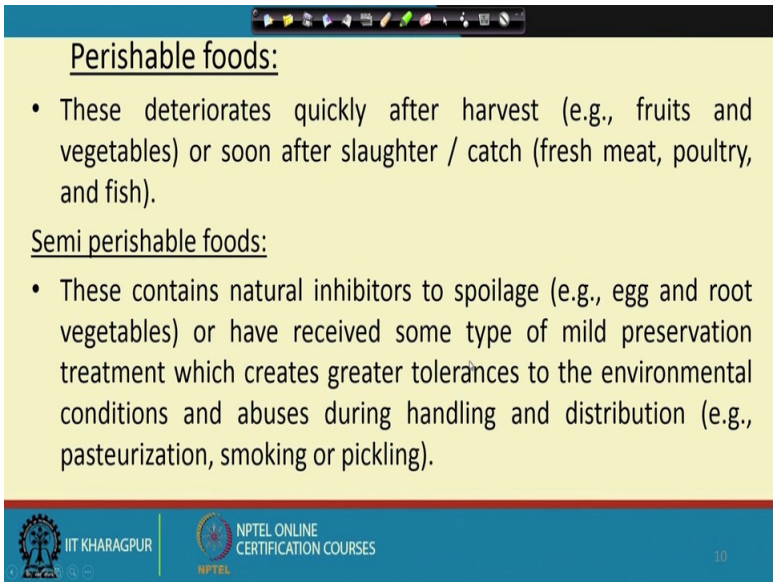

For understanding some of the terminologies which are normally used we call that this food has become perished or it has it is perishable right, what does it mean it means that these deteriorates quickly after harvest for example, fruits and vegetables or soon after slaughter or catch for example, fresh meat, poultry or fish right. So which those which are quickly deteriorated they are called perishable right, and many of the foods come under this umbrella that many foods are perishable, or most of the foods are perishable. Perishability may be different depending on the food product itself right whether it is naturally available or whether it is being processed even then perishability also come in right.

So those which deteriorate with time or early they are quickly they are called perishable right, then semi perishable foods the best example is egg, because you see again nature is our best friend the nature is not the enemy nature is our best friend nature has created

such that egg because from the egg if it is hatched then there will be the young depending on what egg it is right.

So if it is chicken, egg then it will be that the chicken will be hatched and it will produce some young for that nature has created 1 shell over that because in inside if you see in terms of fat protein carbohydrate and all others everything is there. And this will be converted into a living scene and animal kitchen; sorry and animal chicken will be produced. So there it is nature given that the shell is providing is provided such that these materials are protected, so that is what we call semi perishable right.

So by definition we call it to be those contains natural inhibitors to spoilage for example, egg and root vegetables these are normally under the umbrella of semi perishable, or have received some type of mild preservation treatment which creates greater tolerance to the environment conditions and abuse during handling and distribution. For example, pasteurized or smoking or pickling all these right, normal as we get earlier example of normal milk if it is in the hot summer kept then it is gets spoiled right, but if the same milk is pasteurized (why do we pasteurize will come afterwards), but still since it has come why do we pasteurize pasteurized this was termed as per the name of the inventor Pasteur Louis Pasteur.

So he showed that if things are pasteurized liquid foods are pasteurized then the chance of getting ill or infected is minimum. So what pasteurization is done doing it is killing all the pathogenic organisms pathogenic mean those which are causing disease. So disease producing organisms are getting killed by the process pasteurization right. So we can then keep it for some time, because the milk which you had originally heated, I said earlier you had boiled and may be kept and consumed may be after couple of hours. So by that time many organisms might grown in that, but they might not be pathogenic. So in pasteurization your fundamental thing is that you will kill all the pathogenic organisms which causes diseases and you are not allowing any organisms to grow then after semi perishable foods.

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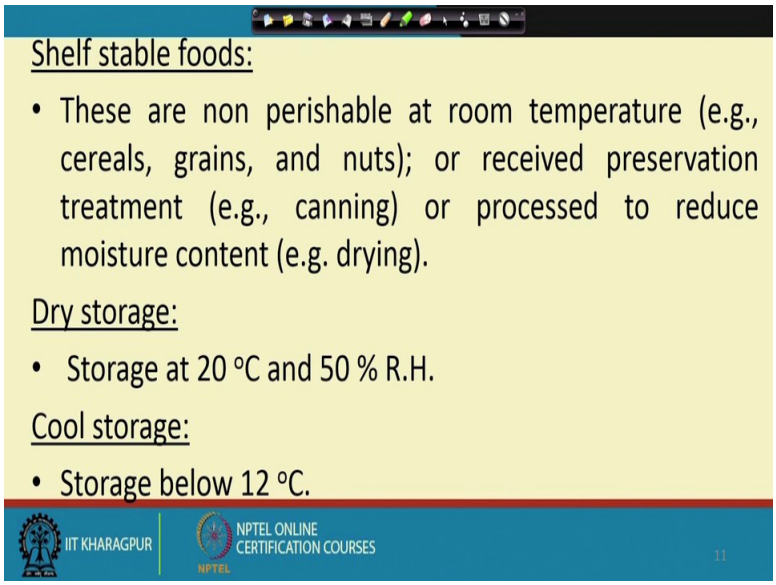

Let us define some more like shelf stable foods right in many houses, now a days of course after. So much urbanization things have not become you might not have come across. So frequently but at least during our childhood we had seen that many people used to buy lot of bora; bora means that that container where rice is kept right, that bag gunny bag in that rice is kept for months together, so people used to buy the entire lot maybe because they are buying a lot at a time.

So, some concession some advantage might be obtaining, so that is not now a days because ours storage space is also not, so much available as earlier everything. So what do we are referring is that shelf stable food means which are by itself stable right those are non perishable at room temperature for example, cereals, grains, nuts, or receive some kind of preservation treatment for example, canning, you might have seen and taken some canned foods right, and this canned foods are again boiled for definite time temperature combination.

So that organisms whatever it be is destroyed and they are available for around the year today's period is very high, so that is why they may be termed as shelf stable right, processed to reduce moisture content for example, dried foods dried foods are also shelf stables because one of the factor why organisms will go, organisms will grow is what is the moisture present in that? How much moisture is available for the organism to grow, if you are removing them by the process called dry, then you are bringing down the

moisture content to the level where organisms cannot grow, and this is called your shelf stable then some other definitions likes dry storage that is storage at 20 °C, or 50 % RH cool storage that is storage below 12 °C, refrigerated storage.

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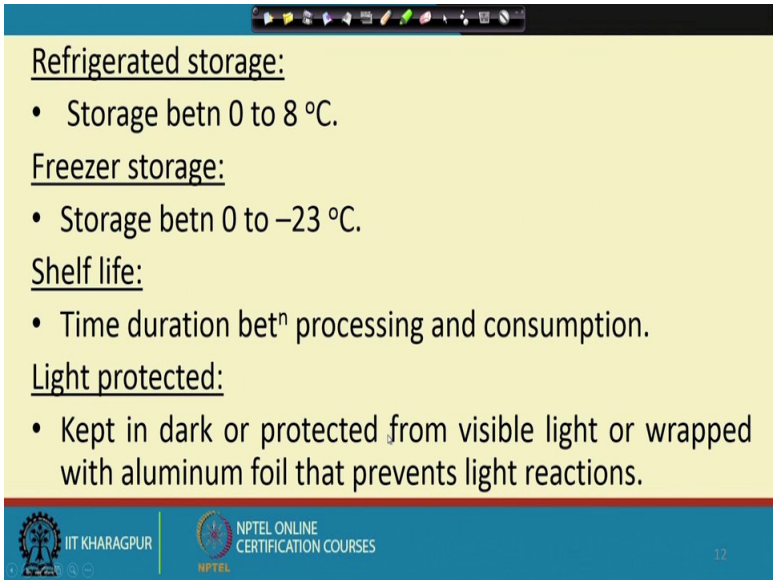

That is storage between 0 to 8 °C, then freezer storage that is storage between 0 to minus 23 °C, I am just coming shelf life time duration between processing and consumption, light protected that is the kept in dark or protected from visual light or wrapped with aluminum foil that prevents light reactions right.

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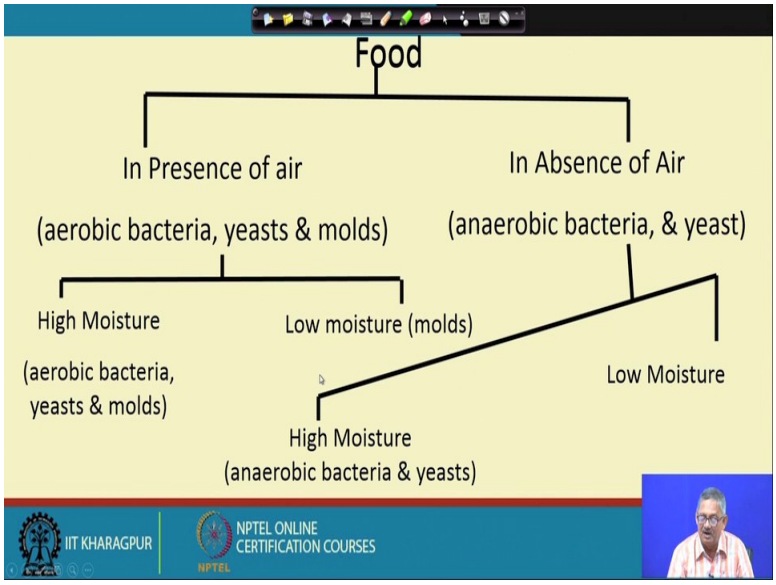

So under all these will come this today; it may not be possible to go there, but will come next time, but till now whatever we have defined under that you see refrigerator storage we have said 0 to -23°C right, I since in this class time is almost over. But I will carry forward it to the next and bring this topic again that why we are saying it be -23 °C or around that -23, 25, 30 °C this word -18°C , where why it has come you will see most of the books that present storage is at or below minus 18 °C in most of the books any book you follow you come across this that in most of the books it is said minus 18 or below why the number minus 18 right.

So this we will discuss in the next class a little because some study may be said so that you understand easily.

Thank you.