

Dairy and Food Process & Products Technology
Prof. Tridib Kumar Goswami
Department of Agricultural and Food Engineering
Indian Institute of Technology, Kharagpur

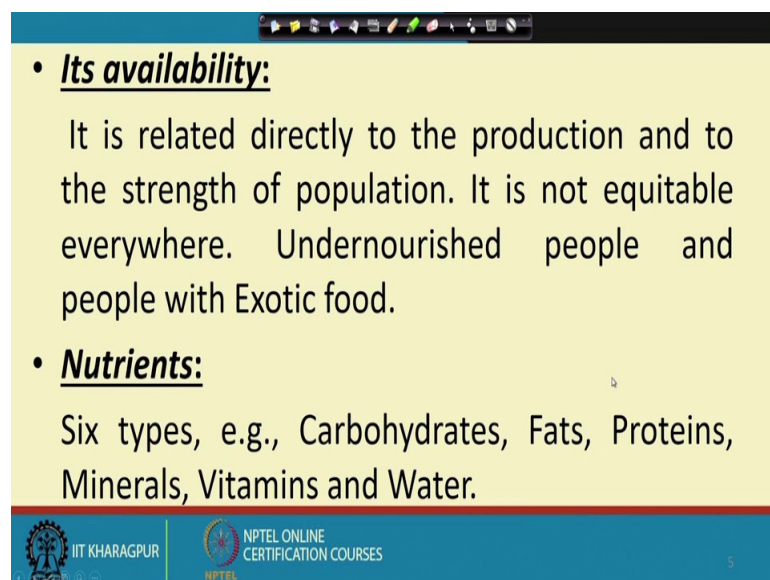
Lecture - 02
What is Food and Nutrients

So, after the preamble now we have to come to the main course, this is the every class at the beginning we will show you what is the course title and where from it is being offered and who is offering, this comes under this first slide right.



So, here you see this is after the preamble; now we come to the regular class. So, our topic or the subject is Dairy and Food Process and Products Technology. We have given in the preamble, what we will be covering how we will be following and what benefit we will be getting. So, we now go to that right.

One more thing let me also share with you that, this year our recording system has a little change. So, nowadays we are using it a commercial thing right.

(Refer Slide Time: 01:20)



- **Its availability:**
It is related directly to the production and to the strength of population. It is not equitable everywhere. Undernourished people and people with Exotic food.
- **Nutrients:**
Six types, e.g., Carbohydrates, Fats, Proteins, Minerals, Vitamins and Water.

 IIT KHARAGPUR |  NPTEL ONLINE CERTIFICATION COURSES

we are using a very sophisticated instrument right.

(Refer Slide Time: 01:28)

Basic principles and methods of food processing and preservation

- **Food, What it is?**
One of the three basic requirements of mankind. It is also regarded as a source of power.
- **What it does?**
It is the source of nutrients and provides the energy required for all activities, e.g., Growth, Repair of the damaged tissues, Reproduction and sustenance.

IIT KHARAGPUR | NPTEL ONLINE CERTIFICATION COURSES

And, I been all that much older than you can navigate, you can negotiate at your age, you can handle not only that you can also do things much quicker faster than ours. So, I may land up sometimes in some problem. So, that time I will ask excuse from you so, that the necessary management or necessary changes can be made.

However, I will try my best not to land up with any such problem, but this is in the beginning, I have shared with you right. Because everything will has or other has been made much friendly to you, this is not for us this is for you. So, that you face very minimum problem, when you are going through the course repeatedly maybe through the through the videos, then the video should be very friendly and acceptable to you. To for that this kind of again integration of the new technologies, our institute or our system has brought in right.

After the preamble now let us come to the level that what is food. Now, the first question comes what is food right. I personally define of course, in all books also we will find in a in a same; may not be the same language; if everybody will tell right, but the meaning is same that whatever you take through your mouth, normally right. I am not saying abnormally somebody is sick.

So, that time his/her food is given through some nerve OR through some injection. So, those things are different; those are not normal. So, normal things are what do you take through your mouth or for the betterment of you or the nourishment of you or the

maintenance of your body, for the up scaling, upgrading yourself, which will help assist you, is can be said to be a food. Normally, people are which is a plenty available in the nature one is plenty available air, free, plenty available and another is also as of now free plenty available water right.

So, air of course, you never take as a food, but you take for someone some other thing like you take it for your respiration right. Air is the respiration side basic component; unless air is there, you cannot respire right. In that also when you are doing respiration if you come into that, you will see there also food has a direct role. Because in the respiration it is not the air only if you take, then you can respire and you can sustain you can survive.

It is not because air is one component in that respiration, other component comes from the food because in the respiration what we get? We take air we get from our body through mechanism the basic of the respiration that is the glucose. So, glucose is the basic of the respiration cycle, and then this glucose is converted into carbon dioxide, water and energy. So, we get sufficient energy through respiration.

And that is where glucose is the primary, glucose is the primary food which you have taken. You might not have taken directly glucose, but your body system has made glucose available for the respiration cycle so, that that is never disturbed. I often tell my students that nowadays everything is so much the whole world is in your hand, because you have you have you have laptop as well these palm top and smart phones etcetera. So, the entire world is in with you perhaps.

So, if you have seen that in many cases; in different channels TV channels, these are coming that people are stuck in may be at high altitude or maybe at very remote place, there is no supply of food no supply of water nothing, but still they survive right. So, though these are out of our syllabus, but this is a common knowledge commonsense that we must know.

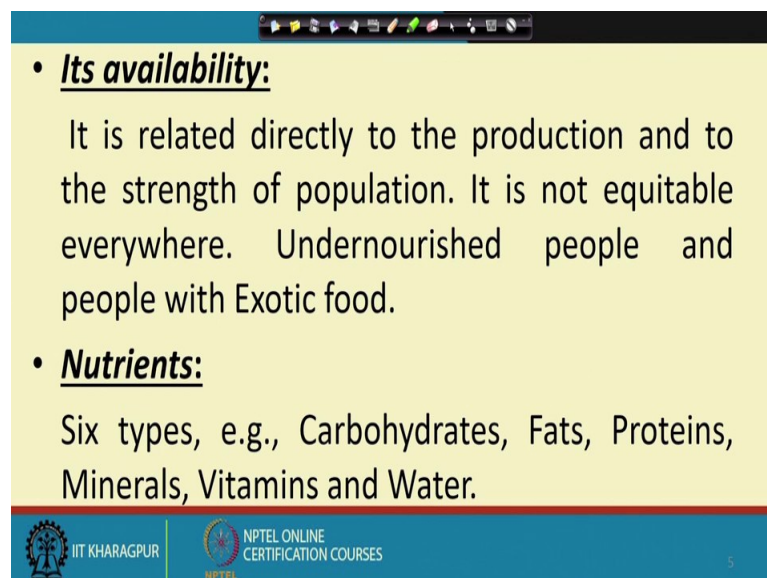
It is also indirectly coming this is also indirectly coming how it is indirectly coming? That you are stuck may be say high altitude around Kanchenjunga at that way very high altitude right. For some reason you are a mountaineer and there you have no food with you no people surrounding you, no food no water nothing, but still may be after seventeen days if the rescuer finds you may be alive.

In many cases it has happened you all know, how they could survive for such long because when it was required, your body system used to utilize because we will come that basic nutrients, what are the basic nutrients required by the body? right. So, those basic nutrients were supplied by your body that is why you could have survived for such a long right.

So, coming back to that original, what is food we say that anything, which you are taking through your mouth as for the purpose of the benefit of yourself, your body, your mind, your entire thing, growth, for your growth, for your sustainability, for any and every cause you are taking something which is directly or indirectly helping to sustain to maintain to improve to generate energy everything that is termed as food right. So, that is what here we have said that, one of the three basic requirements of mankind is that food right and this is the source power of entire your system right.

So, what does it do? We have already said; it is the source of nutrients and provides the energy required for all activities for example, growth, repair of the damage tissues, reproduction, and sustenance etcetera whatever you can name right. Anything that is required is called is called your food that is required for the sustenance, for the maintenance of your body, that product which helps it is known as food right.

(Refer Slide Time: 10:45)



- **Its availability:**
It is related directly to the production and to the strength of population. It is not equitable everywhere. Undernourished people and people with Exotic food.
- **Nutrients:**
Six types, e.g., Carbohydrates, Fats, Proteins, Minerals, Vitamins and Water.

Then availability right; if you are aware the world situation, you will see that there are many people who are taking exotic foods, luxury foods days in day outs.

But there are also a good number of people, who are not being able to even take single meal a day, so, such wide variation is there in the whole world, it is really pathetic that one is enjoying to the fullest and the other is suffering again to the bottom part of the life. So, these discrepancy should be minimized who can do?

You as food scientist food technologist or food engineer whatever you call it to be, because I am telling food that after it has come from the field you are handling that, and that comes under agriculture that production of the food that comes under agriculture that is not under your purview. Your purview starts from the point when it is harvested, that is why it is associated with the name of post-harvest right this can be with respect to plant origin, with respect to animal origin whatever it be right.

In animal origin if it is then we got it to be slaughtered or it can be chopped or cut like fish you cut, you do slaughtering of the animals for meat right similarly poultry eggs, all these hens these all are under the post-harvest during its rearing or during its growth that does not come under your purview.

So, when you are getting it, that time you must be knowing that the availability of the food all over the world is not uniform, somewhere exotic foods are available somewhere basic requirement is also not available right. So, availability is the fundamental question all over the world as a food scientist or again engineer if you are coming across try to make it uniform so, that people all over the world do you have minimum requirement of the food why? Because if somebody is getting access, somebody is not getting at all then the discrepancy comes here that the basic nutrients because we are all living being.

So, we need all the time some energy, some food material as the intake right that is what we are consuming and that is giving us the livelihood for surviving right. So, what are those? So, they are called in a one term nutrients. So, there are six basic nutrients right one is fat, second is protein, third is carbohydrates, fourth is vitamins, fifth is minerals and sixth which we are saying that is, you can also club vitamin and minerals together, but sixth which we do not give the due in acknowledgement that that is the water.

In your body system also you will see the majority is the water and when you come across with a any food any living thing like that, we will see that normally their range is around 60 to 80 % or 90 % is the water and rest of the things are other things.

So, water has a very high role in maintaining your body, in improving your body, in your growth, in your sustenance, everywhere water is playing a very vital role. Either you are taking directly as liquid water or you might be taking through some other sources as we have mentioned as a food. Food also give you some water, but still you need to supplement that by the body requirement according to the body requirement some quantity from the external source other than food. So, the basic nutrients are six types carbohydrate, fat, protein, minerals, vitamins and water right.



So, these are six basic nutrients which are required by the body, that is why that food should be available to everybody for is or are living or sustenance right. Exotic food is fine; some people may enjoy, many people may enjoy if everybody all over the world could get as exotic food nothing like that, but the disparity is so much that in one end one end we are getting exotic food, we can afford to buy and other end some people cannot afford to buy availabilities is also not there both are true and they are really struggling.

So, these disparity should not be there it should be as minimum as possible right. And I do not think we will give lecture on this because this is not the class for that, but at least awareness should be there that yes it is mainly distributed throughout the world.

(Refer Slide Time: 18:28)

Nutrient contents in some different foods:

Food (100 g)	Water (g)	Carbohydrate (g)	Fat (g)	Protein (g)	Vitamin & Mineral (g)
Milk	87-88	4.5-4.9	3.3-3.8	3.5	0.1
Bread	40	50	2	1	1

 IIT KHARAGPUR |
  NPTEL ONLINE CERTIFICATION COURSES

Then comes what does these nutrients do right. So, let us take some example of different types of foods, where all these nutrients are present. See if we take 100 grams of food say in one case milk and in other case bread right. In one case milk and in other case

bread if we take, then in milk we get water around 87 to 88 percent roughly because again milk is a when we will go to the milk itself, then we will see that there are many factors which are responsible whether it will be 87, 88, 90 or 85%. So, it is having wide variety.

But this is an representative number right. So, you can have. So, when it 87, 88, you have the mind it will have 85, 90 %it is not 15, 20 % right. So, that is why representative sample number is given as 87, 88 to water.

Carbohydrate around 4.5 to 4.9 % somewhat; that means, carbohydrate is around say 4 to 4.9, fat around 3.3 to 3.8/100 g edible milk right. Milk is entirely edible. So, there is nothing that this part is edible and this part is not edible. So, around that, protein it is around 3.5, vitamin & minerals around 0.1g right.

If we take these as one and half the basic components of the nutrients available in one of the foods like say milk, the other one which also you take a everyday almost that is the bread another example I am giving. That is bread it contains 40 % water. Again some bread may contain 45, some bread may content 35 right. So, we are not going into that dispute.

It is again representative sample right it tells that bread has around 40 % if somebody ask you will not say bread is 90 % like milk right or milk is 40 percent like bread. So, that is this distinction to make I have given this more or less two extreme, I am not saying they are absolutely extreme, but two almost different poles there. So, milk around 85 to 90 % bread around 40 % water moisture is there. The role of moisture will come afterwards subsequently so, that is different, but it is like that ok.

Then carbohydrate around 50%, fat around 2%, protein 1% and vitamins and minerals 1% right. In milk is towards 1 gram in per 100 gram whereas, in bread it is one gram I mean 10 times, then that milk protein it was 3.5 %, here it is one in bread a fat it was around 3.5 %, here it is 2 %. Carbohydrate is around 4.5 % in milk, here it is around 50 % right and rest is water.

So, 40 % is around water then the question comes when this kind of discrepancy, then that is why nowadays you have come across with one word many people have been

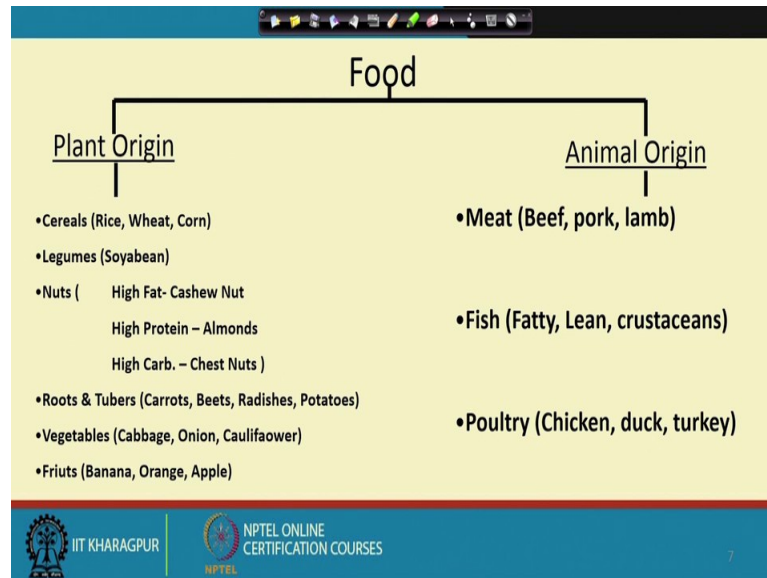
saying and one more thing as food what I said in the preamble, here also suddenly it came to my mind before and manage to forget.

Let me also tell this that nowadays I said those by which we take through mouth those things for our vitamin, nowadays if people are becoming so much I do not say that sick or ill or something like that at least, the urban places people are suffering a lot then definitely in the rural. So, what doctors do tell that do not take medicine as in the name of medicine, because urban people they have lot of thought or lot of thinking or lot of work or lot of many other things. So, this will unnecessarily put up into stress. So, to avoid that stress, doctors also do tell that please do not take your medicine, if it is more in number say somebody is taking maybe a day 8 to 10 medicines a day.

So, he will think I am surviving on the medicine no; doctors were saying that you take this medicines as food, you take this medicine as food because then the food which you are taking ok the milk has one name, bread has another name this is also this capsule that tablet that is also another. So, you take in that spirit, then you will not be under stress that you are taking milk you are taking medicine you are sustaining on medicine right.

So, I again corroborate that, those which we take for our betterment for maintenance is the food. So, we have come that there are six basic nutrients. That are fat protein, carbohydrate, minerals, vitamins, and water, and we have given two examples one with bread and another with milk, showing wide variety. Sometimes ok what does these do then also this question we came right ok.

(Refer Slide Time: 25:44)



Will come to that, I said earlier that if it is solid food, not the liquid then we have two origins. One is plant origin another is animal origin. If it is from plant origin then they come under the umbrella of cereals like rice, wheat, corn, etcetera some legumes like soybeans and many others, some nuts like high fat cashew nut or high protein almonds, high carbohydrate chest nuts, these are available.

Roots and tubers they are under the family of plant origin. So, normal we do consume carrots, beets, radish, potato, these are under the roots and tubers vegetables may be cabbage, onion, cauliflower many others do take we do take fruits many be banana, orange, apple all these are under the kingdom of animal origin.

Then comes the other and by and large yeah by and large in our country, we do call these to be under the umbrella of vegetarian right. Any product any food we made out of these we call it to be vegetarian food or veg right. So, the other category non vegetarian that comes under the umbrella of plant animal origin right; obviously, if it is animal origin then it comes under the umbrella of meat, meat may be beef meat, pork or lamb, any such chicken all these come under the meat.

Then fish and when we are talking about fish, one thing also you should know though this is beyond the scope of the class, but as a information that. Fish is much better much assimilable, then corresponding meat. Because of many factor because of many reasons right fish is more this much - at least you must know that, fish is more assimilable in the

body of man, than that in the body from the meat right. A because all over the world there are all together different types of people right everybody has different constitution different to nature etcetera.

So, the habit food habit cannot be identified cannot be identical also. But even then it has been observed by the scientist that if it is from the fish origin, then it is much more assimilable than that in the in the in the meat from the meat itself right. So, in the fish again there are two varieties like fatty fish or lean fish or may be some others like crustaceans right. So, fatty fish; obviously, from the word it appears, that the fish contains high fat right fish contains high fat, but if it is not that fatty fish if it is less fat then that is called lean fish.

Lean fish has roughly less than around 2 percent fat and fatty fish has high as 20 percent fat. 20 percent fat is a very high quantity right 20 percent fat is very very high quantity and again I am saying that, the fat which is comes from the fish is more assimilable than that from the meat even the proteins are also more assimilable than that in the from the rather are other meat right.

So, these are the two variable varieties that is meat and fish and third one is under the category of poultry. But poultry; that means, which is being reared right which is being reared may be at home or commercially that is different, but from there it may comes under the egg or hen right chicken, duck then turkey, all these which are which are being reared at home or may be commercially, they come under the purview of the poultry right.

So, poultry contains chicken duck turkey. So, all these foods they do supply these six basic nutrients, which we have stated that fat protein carbohydrate, vitamin minerals and water these are being supplied by these food material. Be it animal origin, be it plant origin right. But I as I was just referring earlier that nowadays you might have come across with one word all over that it should be taken as a balanced diet right.

I go back to the case which I said somebody was strapped in high altitude nothing was there. The reverse of that if knowingly if you give somebody only fat the whole day no other thing only fat; some other body a person only protein no other thing some third person only carbohydrate no other thing right will they survive? Obviously, the answer is they will survive.

Because our body system is such there are two types of reactions not too many one can be categorized as chemical reaction and another is biochemical our body system whatever inside reactions are happening, they come under the purview umbrella of the biochemical right any associated with bios are with this directly or indirectly right.

So, our in those biochemical systems, those where fat is only supplied, this fat because our respiration as we said that the basic starting point is glucose. So, if it is glucose and if I am taking fat where from glucose will come? And I am respiring every now and then every women.

So, glucose is all time required. So, body system through those biochemical systems biochemical reactions convert it to glucose. So, that respiration is continued same is true with the protein or carbohydrate also. If you do not take glucose directly if we take some other starch material, then also that is being converted to glucose and then only we can we can sustain we can we can take respiration right.

So, this means that, the basic things are all these six nutrients, but the combination of them in a judiciary manner in a better way, that is why that thing came that you should have a balanced diet so, that it is supplying everything to the body, body does not have to do unnecessarily. As I gave the example fat to this glucose body had to make that system. So, may be some other required things it could not do. So, that is why if we supply, the new thing that is the balanced diet to the body then the person should be perfectly all right ok.

So let us stop it today, here we will start next day and next hour.

Thank you.