Dairy and Food Process & Products Technology
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Lecture - 51
Cheese

So, in our Dairy and Food Process and Products Technology; today, we shall deal with the cheese right, because cheese I, as I told you earlier that we will deal with, one two very popular products. How it is manufactured what are the different, processes and associated things as far we can. So, today we shall do with the cheese, right.

So, cheese this is a fermented product that is coming under the fermented product. So, not only fermentation, but also it also requires primarily of course fermentation, but it also requires your aging and other things. So, those things will and its definition is a very big fundamental one that is a big definition and the thing which came up if you look at the history of making cheese is a dead back to old days where cheese were manufactured not like that.

So, accidentally it happened, because people used to take their food or maybe milk and other things in the earlier days you did not have any transport. So, that time maybe in the container made of the stomach of many animals typically, maybe cow and others.

So, in that accidentally this happened and from there subsequently people have modified, generated, developed and now, it is a very popular all over the world product right. So, let us look into this. Now, today we are in the 51th class and we will deal with cheese.

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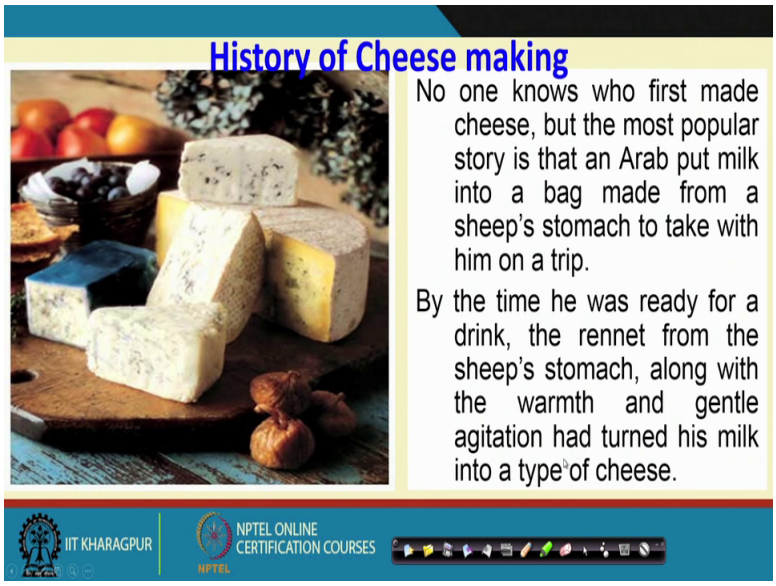

If you, as I said if you look at the history, no one knows who first made cheese, but the most popular story is that an Arab put milk into a bag made from a sheep's stomach to take with him on a trip, by the time he was ready for a drink, the rennet from the sheep's stomach, along with the warmth and gentle agitation had turned his milk into a type of product known as cheese. Subsequently, it was known as cheese.

So, basically you see this rennet that is the one which is primarily from the stomach of the animal and this was in the case of sheep right, because as I said for transportation, they used to use these sheep's or maybe camel and horse and the others so but the container was made from the stomach of the sheep which contained this rennet.

Rennet is an enzyme; rennet is an enzyme available in the stomach of the animal like cow, sheep's all these. They do have this rennet that is why because, subsequently you will see that since rennet is a part of making the cheese subsequently, people have changed it because to get the rennet you have to slaughter the young cow or young calf.

So, that became a problem, because to get the rennet if you have to slaughter cow's and calf's from the animal source then the animal may, I mean the production of animal is not to that extent very high. So, mismatch was there, subsequently people have made it their norm that, this rennet has to be substituted with some other things, which will come across right hopefully.

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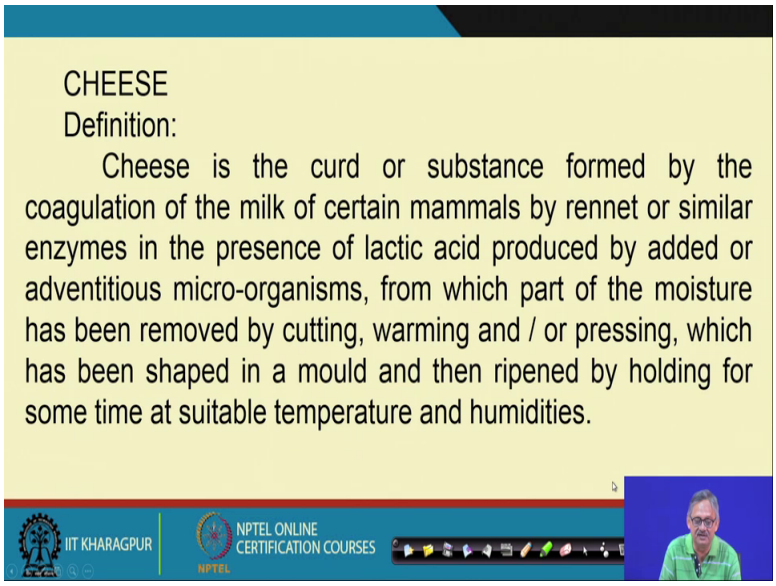

Now let us look into there, what is the definition of rennet, cheese. By definition Cheese is said like that, cheese is the curd or substance formed by the coagulation of milk of certain mammals by rennet or similar enzymes in the presence of lactic acid produced by added or adventitious microorganisms, from which part of the moisture has been removed by cutting, warming and or pressing, which has been shaped in a mould and then ripened by holding for some time at suitable temperature and humidities.

So, lot many things we have said right, lot many things we have said by definition number 1; it is made from the rennet and also could be from it. Adventurous microorganisms which produce lactic acid and then these can be the product which we are getting, then with that coagulated product can be then further cut and warm or press or it can be put into mould then ripen and then it is made to the product called cheese, but this ripening is also a function of temperature and humidity right.

So, it is a not so easy, it is a complex process by which this cheese is done right, from the definition you can understand and if you remember that earlier in our country as of now, whatever at least I have come across from the market. Primarily. this cheese is available from Amul primarily and many others could be there, but primarily, it is from Amul and some of the dairies.

But they are not in our country so much popular as it is in other foreign countries particularly those countries, which are cold area which are in the cold region. So, there it

is more because of course, they also need lot of fat that is why so, cheese when they need, they can take as they take in everything cheese, depending on the liking of the people depending on the, food habit of the people so, it is.

But in our country, it is also getting popularized and Amul has made it a lot, but they have only two three or couple of varieties right, but of course, they are also getting imported and if you go to any big malls or big shopping centres, there you can get according to your requirement.

But the primarily, what we have, you see that Amul, they have cheese slice and cheese cube right, but yeah, if you, you can make it as you require and according to that it can be prepared and supplied right.

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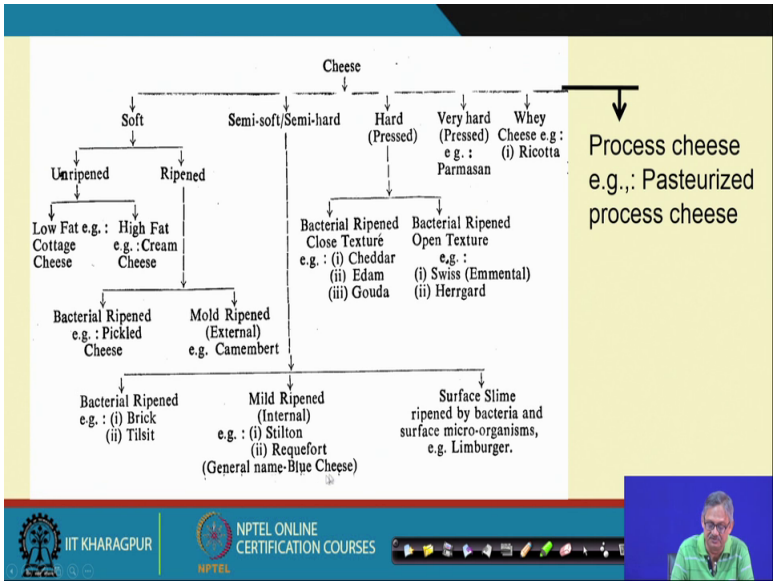

So, then from this definition let us go into this. Unfortunately, I cannot make it bigger, because, because if we look at this, you see that the, if this is the cheese; so, that we can subdivide into soft cheese, then semi soft or semi hard cheese, then hard or processed cheese, then very hard or processed cheese, again then whey cheese or it may be processed as such processed cheese right.

And in examples we have given that for, very hard pressed cheese you know, this is very hard pressed cheese we can name that one is Parmesan and in way we can say it, which is you can say Ricotta rather. Then in processed cheese there are many that could be

pasteurized process cheese and others and again in soft variety, we can may get it unripened or ripened and the one in the definition, we had said that it was it is kept under certain container and then, it is kept under certain temperature and humidity. So, during that time this process is known as ripening right. We will also come into this.

So, they are ripened or unripened that also makes a division and if it is a low fat like cottage cheese or if it is a high fat for example creased cream cheese. They are also under unripened condition. Then for ripened one we can have it bacterial ripened. For example, pickle cheese or it can be more ripen, for example, we can call it Camembert right.

So, then under the category of semi or hard or semi solid or semi soft, whatever you call it, that under that category, it can be re again bacterial ripened. For example, Brick or Tilsit or this is mold ripened right, not mild mold ripened and that can be again internal the, that it is it can be Stilton or Roquefort right. This generally, blue cheese known as blue cheese or it could be surface line ripened by bacteria and surface microorganism for example, Limburger right.

So, under the hard category, we hard pressed category again it could be bacterial ripen. For example, Cheddar cheese, Edam cheese or Gouda cheese or it could be bacterial ripen that was close texture and this is open texture for example, Swiss cheese or Herrgard right. Now, out of these cheese there are many which are famous for example, that Swiss cheese you might have heard it right. So, it is good that we could make it a bigger, we could make it bigger.

So, this is the one which we are looking for and that, this yes I made it further bigger. So, processed cheese, pasteurized process cheese, which is Ricotta then very hard or pressed cheese is Parmesan, hard or pressed cheese they are Cheddar, Edam, Gouda or bacterial ripened, open texture that was close texture Swiss or Herrgard or here also we get that Stilton, Roquefort, which is commonly known as blue cheese.

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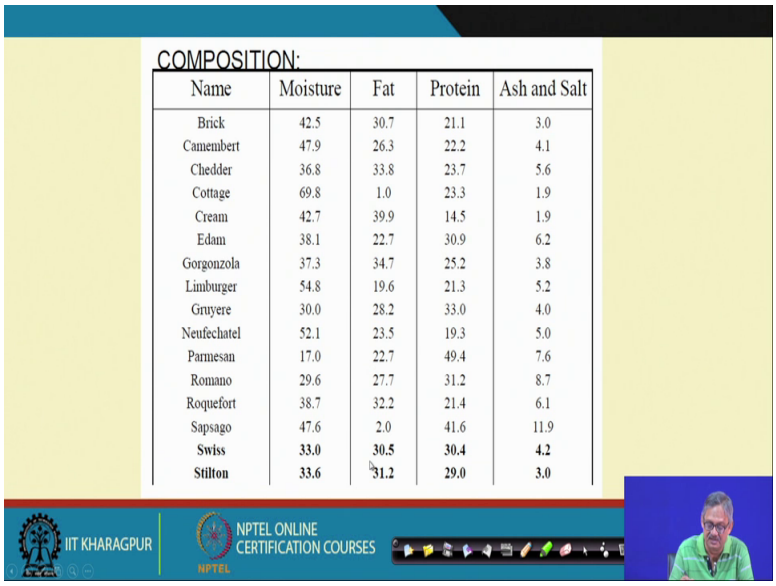

So, all these variety there are, there are 10, more than 2000 varieties of cheese available all over the world. So, and naming is typical; naming is typical in the sense maybe say at IIT Kharagpur, if you prepare one, so that can be named under the IIT Kharagpur again, whether it is bacterial or mold or ripened or unripened or soft or hard depending on that. So, different namings are there and that is why the varieties are around 2000 or even more right. It is widely such a wide variety, product is normally not with any other things right. So much variations around 2000 or more than that, this varieties are there.

Composition, if we look at, there are different names right, different names like Brick, Camembert, Cheddar, Cottage, Cream, Edam then Gorgonzola or Limburger or Gruyere, then Neufechatel and Parmesan, Romano, Roquefort or Sapsago, Swiss, Stilton all these are different names of the different variety, but you see the moisture content it is varying.

So, widely the smallest or lowest one could be 17.0 and the highest one could be somewhere 69.8. So, within this such a wide range, this moisture content varies right and, fat content also varies very widely like the smallest one, could be 1 percent fat and the and the highest one could be around 39.9 percent. Yes, this is the highest so the smallest one is 1 and 40 percent fat that is the fat variation.

So, widely 1 to 40 it is not so wide variation then protein content, it is relatively less, but still it is very wide, it is around, the lowest one is around say 19.3 and, the highest one is

say 49.4. You know, the lowest one is not this one, the lowest one is 14.5 and not 19 14.5 and the highest one is 49.4 right.

So, such again the wide variation of protein, then ash and mineral content or salt content, if we look into that, that is also very wide and this range between 1.9 and say 11.9 such a wide variation, in ash or mineral content 1.9 and say 12 to 11.9 is roughly 12 right or 1.9 can also be made. So, 2 to 12 percent so, much wide variation of the minerals right, the minerals or what we call it to be dash content and such a wide variation of the composition in terms of moisture, fat, protein and minerals is only possible in cheese.

You will not see in many other commodities such a wide variation in composition right, but the product is same cheese. Obviously their appearance, their flavour, their taste everything are different as well the nutritional value, because that composition will also indicate their nutritional value. So, high protein, high fat, low protein, low fat, low moisture, high moisture, low mineral, high mineral. So, any combination you can prepare and then make it popular, that is why as I said all over the world more than 2000 varieties of this cheese is available, more than 2000 varieties right.

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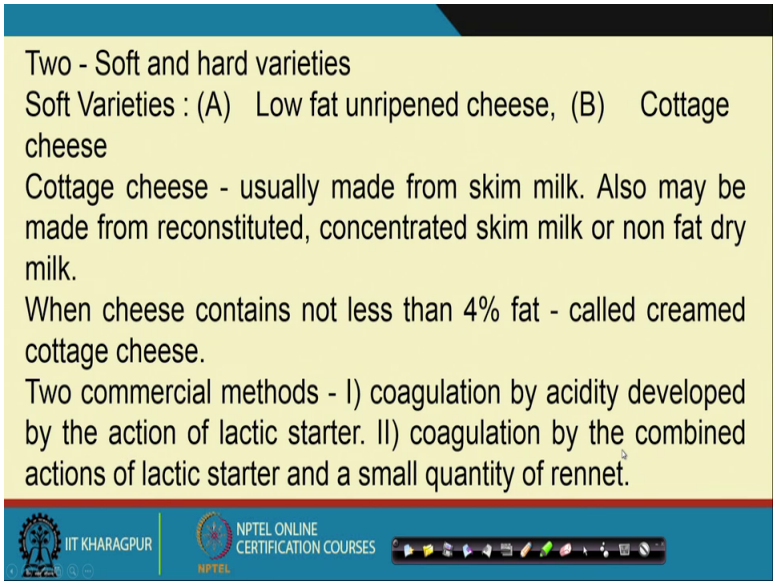

So, if we look at then, the there are two soft and hard varieties which are which we will talk about one is low fat unripened cheese and the other is cottage cheese right low fat unripened cheese more than that cottage cheese is at least popular in our place. So, we can harp one the cottage cheese, the cottage cheese usually made from skim milk also

may be made from reconstituted and reconstituted we have said the other day right you have a powdered milk and that is reconstituted and concentrated skim milk or non fat dry milk. So, anyone could be used for cottage cheese.

So, when cheese contains not less than 4 percent fat this is called creamed cottage cheese. So, minimum 4 percent you if you have seen earlier that which we had given which we had given that here that cottage cheese right fat content is around 1 percent right. So, for fat content is around one percent whereas, moisture is around 70 percent protein is around say 24 percent and ash content is around 2 percent right.

So, if this contains your 4 percent fat then it is called typically creamed cottage cheese right two commercial methods are there; one is coagulation by acidity developed by the action of lactic starter or coagulation by the combined actions of the lactic acid starter and small quantity of rennet right. So, that is why this cottage cheese is so, popular that you may not use rennet because the availability of rennet maybe a problem.

So, that is why that acid formation is done by the lactic acid bacteria and there you can produce your desired lactic acid with the known variety of the organism and you can you can eliminate the requirement of rennet. So, that is why cottage cheese is getting popularity in our country, it is becoming easier to manufacture.

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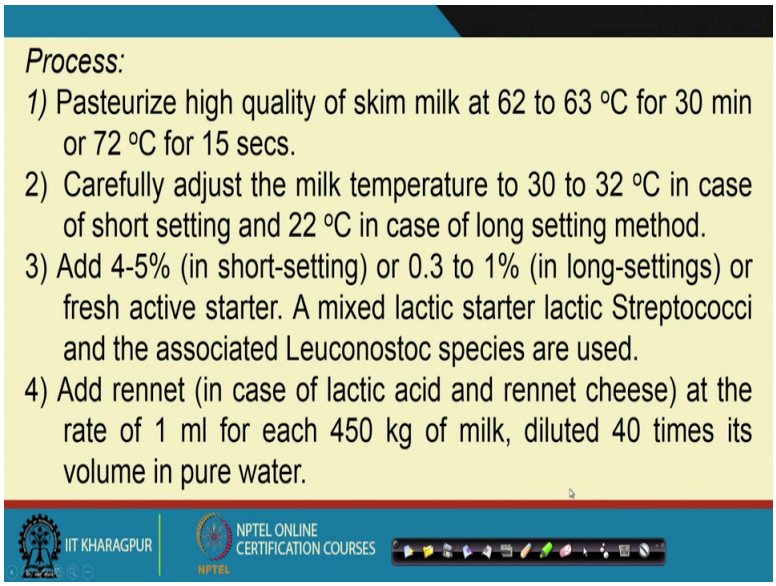

Then the process says that first you pasteurize, you have already the resource of the milk. So, pasteurized high quality of skim milk at 62 to 63 degree centigrade for 30 minutes or 72 degree centigrade for 15 seconds. The other day I said nowadays, people are making this holding time typically for high temperature more than even 15 seconds maybe, couple of 10 seconds more so, that there is no chance of any residual organism, which can cause disease that is disease producing organisms, because micro you remember that one organism that was micro bacterium tuberculosis. So, that was very much heat resistant and for that reason the, holding tank could be a little bigger or longer than required right. So, that is why maybe in instead of 15 seconds, it could be couple of 10s of seconds more, maybe 25 35 seconds.

Then carefully adjust the; carefully adjust the milk temperature to 30 to 32 centigrade, in case of short setting and 22 degree centigrade in case of long setting method. Add 4 to 5 percent in short setting or 0.1 to 1 percent in long setting or fresh active starter, mixed lactic acid starter or lactic streptococci and the associated Leuconostoc species are also used and you can add rennet in case of lactic acid and rennet cheese, where combination of that is, we were using at the rate of 1 Millilitre for each 450 gram of milk. So, 1 Millimetre of rennet for 450 kg of milk, diluted to 40 times it's volume with pure water right.

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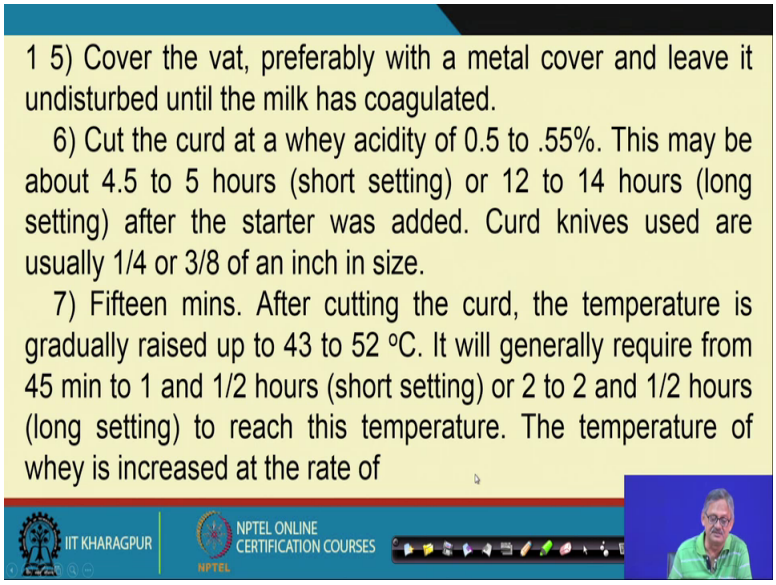

Then the process follows like this that covered the vat; cover the vat preferably with the metal cover and leave it undisturbed until milk as coagulated, cut the curd at a way acidity of 0.5 to 0.55 percent and this may be about 4.5 to 5 hours, that is for short setting or 12 to 14 hours, that is for long setting is used, after the starter was added, the time is measured.

Curd knives used are usually one-fourth or three-eight of an inch in size. Then 15 minutes after cutting the curd the temperature is gradually raised up to 43 to 52 degree centigrade. It will generally require from 45 minute to 1 and half hours that is for short setting or 2 or 2 and half hours for long setting to reach this temperature.

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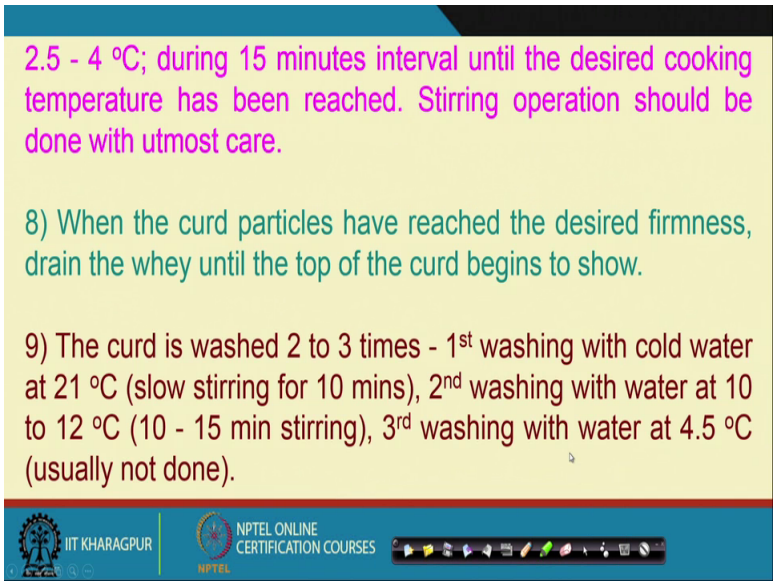

The temperature of the way is increased at the rate of 2.5 to 4 degree centigrade during 15 minutes of interval; 15 minutes interval until the desired cooking temperature has been reached. Stirring operation should be done with utmost care.

The next step is when the curd particles have reached the desired firmness, drained away until the top of the curd begins to show. The curd is washed 2 to 3 times; first washing with cold water at 21 degree centigrade that is low stirring for 10 minutes, second washing with water at 10 to 12 degree centigrade for 10 to 15 minutes stirring and third washing with water at 4.5 degree centigrade and generally, at this low temperature washing could be avoided.

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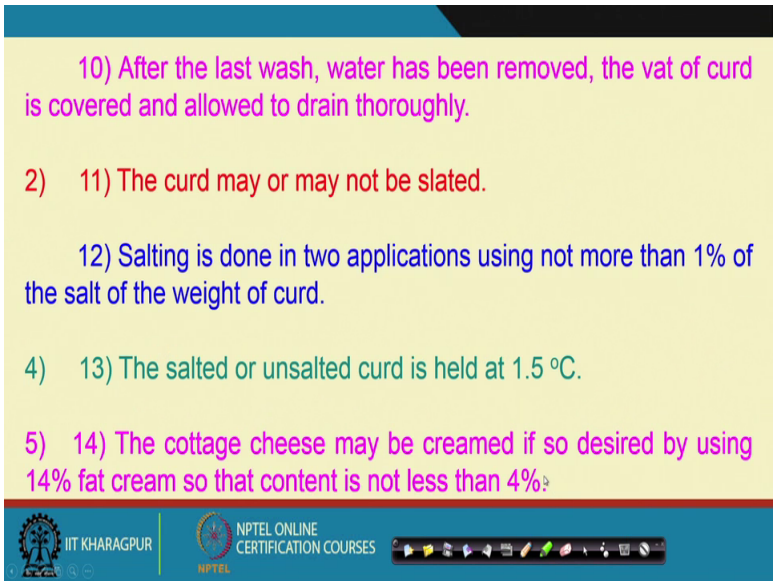

Then after this you, after the last wash water has been removed the vat of curd is recovered and allowed to drain thoroughly, the curd may or may not be slated or this is the perhaps, mistake. This is salted, may or may not be salted right and salting is done to apply using not more than 1 percent of the salt of the weight of the curd, that is the salt which can be; the salted or unsalted whatever it be, is held at to 1.5 degree centigrade.

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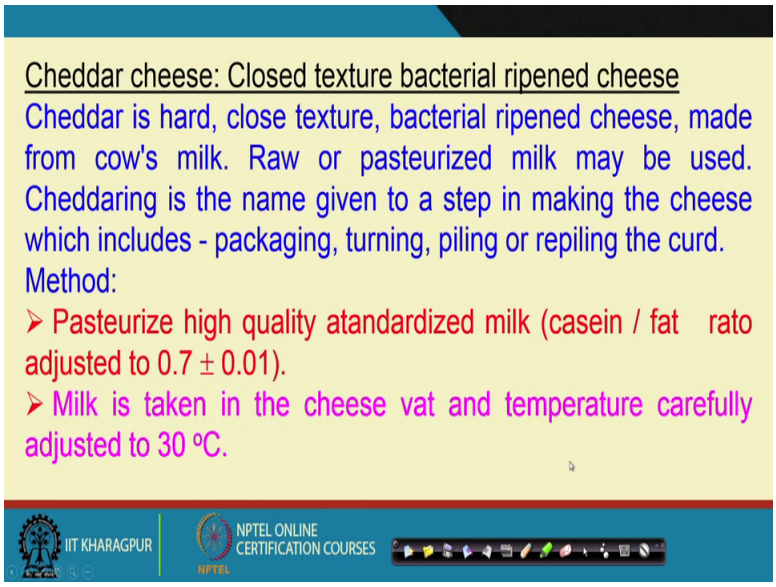

And then the Cottage cheese be creamed if so desired by using 14 percent fat of cream. So, that the content is not less than 4 percent what we said that cream cottage right,

Cottage cream and then this way you can prepare the Cottage cheese it is very easy right. Now, perhaps we are running out of time in this class next, we will go in the next class another which is called Cheddar cheese.

Thank you.