

Course Name: Canning Technology and Value Addition in Seafood
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Department: Food Science and Technology
Institute: Kerala University of Fisheries and Ocean Studies
Week: 1
Lecture:1

Welcome to the new NPTEL course Canning technology and value addition of seafood. This course is offered by Kerala University of Fisheries and Ocean Studies. The two faculty members will be handling this course myself Dr. Maya Raman. I'm an Associate Professor in the Department of Food Science and Technology, Faculty of Ocean Science and Technology, KUFOS and another faculty Dr. Abhilash Sasidharan. He is an Assistant Professor Department of Fish Processing Technology, Faculty of Fisheries Science. Sir will also join us in the course and the outline of this course it is divided into 11 parts and in the first part we'll be discussing about concept of canning and will also give a brief introduction and in the second part history how it evolved. So, history of canning technology will be discussed and in the third part we'll be discussing about the containers that are used in canning and what are the properties of this canning materials or the containers that are used in canning and in fourth we'll be discussing about the canning process in general and in fifth we'll discuss about the microorganisms associated with or the spoilages associated with canning and why we are concentrating on Clostridium specifically for canning. We'll also discuss about thermal process calculations in part six and in seventh we'll be discussing about the spoilages of canning materials or the cans and how it can be detected and in eighth we'll be discussing about the canning procedures because canning procedure from product to product it differs.

So, we'll be discussing about individual products and the procedures involved and the standards that are involved for each process and in part ten we'll be discussing about the value addition and in eleven we'll discuss about the quality standards of seafood and the regulations associated with it. Now, coming to the overview, so here let's see what all things will come under this head; in the introduction and concept of canning technology we'll discuss about the introduction, definition and concept of canning we'll also discuss about the different containers that are used and 5 Ms and we'll also briefly discuss about the canning processes and advantages of canning over other processing methods and this is a picture of retort this is used for sterilization. Then in history of canning technology we'll discuss about the evolution; how the canning technology evolved and who are the different people who work behind it and what are their contributions and also we'll discuss about containers that is in part three we'll discuss about the containers and their properties well the classification of a containers will be discussed and what are the advantages and disadvantages why we moved from different materials and why currently we are using aluminium cans. So, those will be discussed. We'll also discuss about the

quality parameters of different containers or the materials that are used in developing containers and how to evaluate the properties or the parameters of the containers and what is the manufacturing process how the containers are manufactured these things will also be detailed and in this picture it shows the different cans or the materials that can be used for canning; in part four the canning process, we'll be discussing about the step-by-step process of the technology.

So, each steps that are involved in the canning process that will be discussed and what is the significance or what is the importance of each step why we are doing each step that also will be discussed and what are the different machineries that are involved in the canning process this will also be dealt in detail and what are the different quality issues or by running the process we may encounter some issues or some troubleshoots. So, this may be associated with quality or it may be with the machineries. So, how to solve how to troubleshoot these things that will be discussed under this head and what are the advancements that has happened in the canning process that will also be discussed in this part. Now, this is a picture of retorting machine or the canning machine we have this is an immersion water immersion retort and you can see here this is the place where the retorting is done that is canning is done and this is the door which will be opened and the racks will be placed in the rack will be having containers. So, here you can see different racks being assembled and this is a overhead tank where the water is stored and you can see here the gauges even you can see in this next picture you can see the gauges; here, which will indicate the temperature and pressure inside the overhead tanks so this water is heated and it is passed into the retorting machine through the pipes and this will help in retorting and this is the air chamber where the compressed air is maintained and these are the indicators or the screen which shows how the machine is working or what are the stages.

So, that can be seen here. This is a picture of compressor that is used to compress the air and this is another retort that is steam retort it is a smaller version and again you can open this door and place the cans inside or retort pouches can also be retorted. So, that can be placed inside and you can also see gauges and other meters here which helps in understanding what is the temperature and pressure inside the retort. So, this all starts working when the machinery is in operation. So, this is the inside of the retort; when you open the door this is how it looks like.

Here you can see the probes We have two probes here we can also have one more probe actually. So, three probes one will be put outside and two probes will be placed inside the can which will indicate the temperature at the cold point. So, these probes are placed inside the cans they are placed at the cold point and they will indicate what is the temperature. So, these are used for thermal evaluation and we calculate different heat penetration parameters that is J value, H value, the lag factor etc. So, this will be

discussing in the respective parts and this picture, it shows the trays over which the cans are placed and then these trays they will be pushed or they will be slanted inside the retort and then the door will be sealed properly and then we'll switch on the equipment.

So, this is a seaming machine; double seamer and you can see here a can is placed and you have two chucks here which is which helps in double seaming; actually we have this if you look at the figure here this is how the double seaming happens. So, in the single seam or the first seam the chuck it will bring the hooks together and it is a complete hook formation and it will be compressed in the. So, if you look at the can over here there is a hook like structure in the edges. So, over which the lid is placed and it this is a body this is the body parts this part is reflected here in the figure and this is the lid part and in the single seaming this hook is formed and it is completely compressed or complete hook is formed, seamed second time. So, double seaming.

So, to get this complete hook we are doing double seaming and for that we are using this double seamer or can seamer. For the pouches we usually go for vacuum packaging or we can go for a regular sealing machine. So, this is a vacuum packaging machine where the air inside the pack it is removed and it is completely vacuum inside. So, this is how the pouch is placed in the vacuum sealer and it is sealed over here and the entire air inside the pouch will be removed completely. Yeah, this is a probe over here the cables are connected to the probe and this probe will be inserted inside the cans and the tip of the probe will be at the cold point it will indicate the temperature that cold point is the last point where the temperature reaches at the end.

So, what is the temperature at the cold point this will be recorded by the e-lab. This equipment is called e-lab it records all the temperatures. So, for statistical analysis we take three values three or two or three values. So, you can probe are connected at this point and the values will be recorded in the in the software and these will be used to calculate the heat penetration values. And in part five we have bacteriology that is microorganisms that can be seen in canning industry.

So, first we will classify the foods based on their pH and what are the different micro bill strains the major microbial strains that are associated with spoilages and we also will discuss about the reference microorganisms and that is Clostridium which is taken as a reference microorganism in case of canning. So, that are also will be discussed and what are the spoilages and health risks that that is caused by these microorganisms will be discussed. In part six we will be discussing about heat penetration characteristics the thermal process indicators like D value, Z value, F value, Cuk value will also discuss about 5D and 12D and what is the lethal rate. So, these will be discussed in under this part and graphical representation and how to evaluate it through the graph these will also be taught. And in the seventh part we will be discussing about the spoilage indicators

what are the different kind of spoilages seen in canning and what are the corrective measures to prevent the spoilages.

And in part eight we'll be discussing about item wise sea food canning and each step will be discussed individually and the canning how it changes from products to product that variety of different products will be taken and what are the changes that happen in the processing that will be discussed. And we'll also discuss about the pre-processing methods. So, before processing the product need to be processed so that we can assure its quality and longer shelf life. So, pre-processing will also be discussed in detail and we will also discuss about the additives that are added in the can to improve its flavor and eatability or palatability. These additives they also improve the shelf life of the product and in part nine we will discuss about the SOPs in the canning industry and we will see it individually each product wise.

And in part ten we will discuss about the value addition and under this head we will discuss about composition, nutritional quality, muscle structure and spoilages of seafood then we will also discuss about the methods of preservation that can be adopted to increase the shelf life. And in the last part we'll discuss about the quality parameters that is national international standards of seafood products. So, this is an overview of the course and what will be discussed under this course. This slide it shows different value-added products that can be developed from the byproducts of the industry will include the gut content, the head region, the fins, the unwanted parts which are not used and the food these will be thrown as byproducts. Generally, we dump it or then or else it is given as feed to animals.

So, but then these are also rich in many biotic components and they also have a lot of functional properties. So, for these reasons we can utilize these to develop bioactive products, develop other functional products. So, some of these can be used as nutraceuticals also. So, the first picture is of fish maws. Fish maws it is basically the air bladder which is used for breathing in case of fish it is generally thrown and or discarded it can be used to develop fish maws and fish maws is dried or treated air bladder this can be further treated to develop icing glass and this icing glass they are used for the clarification of the beers.

Beer, generally it is developed from the fruits or vegetables after fermentation. So, it has a turbidity because of the solubles which are suspended in the liquid. These solubles are clarified and it is made clear with the help of icing glass. We have chitin here; chitin is developed from the shrimp shell or the crustacean shell. We also have chitin in fungus and usually for commercial purpose the chitin is extracted from the shells and this chitin is deacetylated to form as a chitosan which has a lot of benefits are there for this chitosan in the medical field and these are used to develop sutures they are also used for many other purposes and for developing packaging materials.

Chitin, chitosan they are rich in glycosaminoglycan. So, they have the medicinal properties are very high. So, you can also see wafers here and shark fin rays are very expensive product it is used for preparing soups usually Chinese people or the Asian countries they prefer shark fin rays and silage is a bio-fertilizer it is fermented product it is developed using the byproducts or the waste parts which are not utilized. So, these are some of the products which we have just displayed here. We'll discuss these things in detail in the respective sections.

Now, we will go to the next session that is part one which will be handled by Dr. Abhilash Shashidharan and sir will be giving an introduction about the canning and its definition and how the canning came into existence or how we started using this technique for preservation; he will be discussing about those things. Thank you.