

**Course Name: Canning Technology and Value Addition in Seafood**

**Professors name: Dr. Maya Raman, Dr. Abhilash Sasidharan**

**Department: Food Science and Technology**

**Institute: Kerala University of Fisheries and Ocean Studies**

**Week:8**

**Lecture:31**

**Quality standards for seafood value added products - Part 3**

Welcome back to the NPTEL course, Canning Technology and Value Addition of Seafoods. This is the last session of this module, National and International Standards. We had seen in the previous session the international standards, how they evolved, and which are the different agreements. For example, agreements like SPS and TBT agreements. Then we have now Codex Alimentarius, CAC. In the previous session, I had mentioned that every nation has their own legal frameworks. In India, we have FSSAI. Different countries have different bodies to maintain food safety.

In India, it is the responsibility of FSSAI to ensure food safety and food quality. Similarly, in the US, we have the Code of Federal Regulation, CFR, and in European nations, we have EFSA, European Food Safety Authority. Similarly, we have bodies in Japan. We also have bodies in Korea and other states, other countries of the world. They adopt the regulations and guidelines from the international standards and formulate their own regulations and see that each producer or the people who are involved in the food sector follow these regulations strictly.

Now, FSSI stands for Food Safety Standards Authority of India. It was established under Food Safety and Standards in 2006. And it comprises various acts and orders which deal with handling of food in various departments. So, they set standards for food to avoid confusions among different stakeholders. Here, stakeholders mean producers, consumers, and processors. By establishing FSSAI, a single reference point has been established, and they are also the single line of command. So, command comes from them and we have to follow these regulations. They set up the standards, they set up the regulations, and it's an obligation on the part of the processors or the people involved in the food sector that they follow the standards and regulations set by the authority. FSSAI has to cover the old acts. For instance, we had Prevention of Food Adulteration Act in 1954, then FPO order, that is Food Products Order in 1955, Meat Food Products Order 1973, Vegetable Oil Products

Order 1947, Edible Oils Packaging Order 1988, solvent extracted oil, de-oiled meal, edible flour order 1967, and milk and milk products order. These were adjoined or they were clubbed together and they're put together as one single act in FSSAI Act. Currently, we don't have these individual acts.

The powers and functions of FSSAI: they frame regulations to ensure food safety and set standards. They also lay down guidelines for accreditation of laboratories that test food. We have FSSAI-accredited laboratories where we can send food samples for testing. They also provide scientific advice and technical support to the central government. If any crisis happens, FSSAI will be the first body contacted in this regard.

If a crisis involves regulated food, then FSSAI has to give scientific advice and technical support. It also contributes to the development of international standards in the food sector. FSSAI, jointly with CODEX, develops international standards. They give suggestions and help in improvising or establishing new standards. They also help in collecting and collating data regarding consumption, demand, contamination, etc. So, anything related to the food, the data has to be maintained by the FSSAI. They also are involved in dissemination of information. The information is what has been created by the FSSAI or the standards that have been developed by the FSSAI. It has to reach to the consumers or it has to reach to the general public. So that is also seen by the FSSAI. They promote awareness. For example, now we have 'Eat Right campaign' by FSSAI. Among the general public, they promote this thing and they ensure that people are eating right food at right time. Similarly, in FSSAI, they pass information and create awareness about food safety and nutrition required by the public.



Now these are the landscape, they are involved in governance and administration, set food standards, they practice food safety, then compliance, licensing, and inspection. They also have food testing

laboratories, training, internship, capacity building, healthy diets, and they monitor behavioral changes, consumer focus, leveraging web-based technology, and research focus. International collaborations are also encouraged by FSSI, and they encourage partnership and convergence.

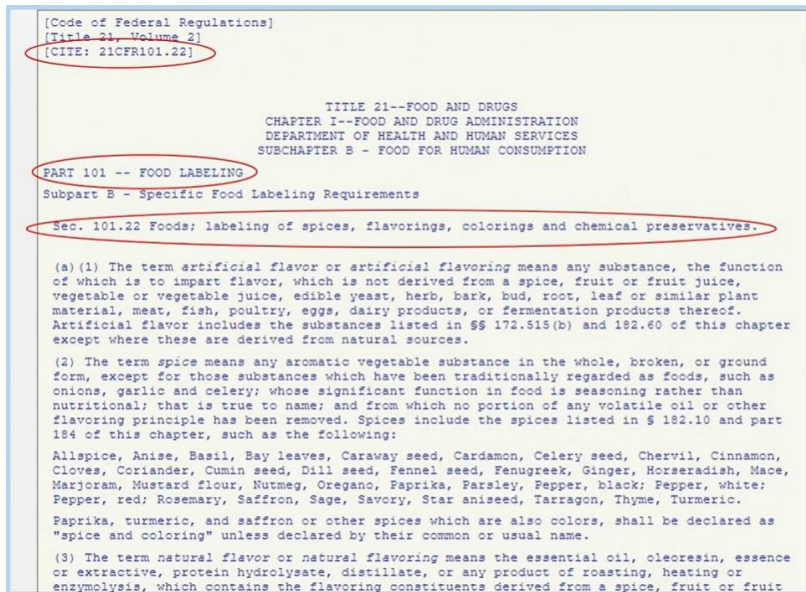
FSSAI is a statutory body under the Ministry of Health and Family Welfare, and presently the chairperson is Sri. Rajesh Bhushan, IAS. The headquarters are in New Delhi. There are six regional offices located in Delhi, Guwahati, Mumbai, Kolkata, Kochi, and Chennai. These offices are actively involved in the different objectives set by the FSSAI.

We have regulations on licensing and registration of food businesses, which were put forth in 2011, then packaging and labeling, and regulations on food product standard and food additives. It is in two parts, that is part one and part two. Then we have prohibitions and restrictions on sales regulation, contaminants, toxins and residues regulation, and laboratory and sampling analysis. Now the latest amended regulation is Food Safety and Standards Rule in 2013. So, according to this FSSAI standards, it includes dairy products, fats and oils, cereals, fruits, vegetables, meat and meat products. They also have standards for fish and fishery products. Along with that, the standards are there for sweets, confectionery, sweetening agents, spices, salts, beverages, and other food products that are involved or that are added as ingredient to the food. Even proprietary food and irradiated foods also have standards which are laid or framed by FSSAI.

FSSAI issues licenses. This is also the job of FSSAI. So, people who are doing food business have to register with FSSAI. If the turnover is below 12 lakhs, only registration is enough. But, if it is between 2 lakhs and 20 crores, then the state license has to be issued, and a central license is required if the turnover is above 20 crores. Along with this license application, other details like the location of business, retail, number of retail stores, also need to be submitted when the license is being issued by FSSAI.

This is about the body FSSAI which is involved in maintaining food quality and safety.

Similarly, we have Code of Federal Regulations Title 21, Food and Drugs CFR 21. This is the regulatory body in the US. They ensure that food is safe and the quality is maintained in the United States. So, there are permanent and general rules codified and registered in the Federal Register, and there are executive departments and agencies of the federal government actively involved in publishing these rules and regulations. Title 21 is reserved for the rules of the Food and Drug Administration. Each title or volume of CFR is revised every year, usually on April 1. So, this is about food and drugs. Now, many nations are adopting the CFR rules.



When you open their regulations, you will find that on the top left, it is 21 CFR 101 22. So, 21 stands for the title, that is food and drugs, and it is usually cited like this. CFR stands for Code of Federal Regulation, and 101 indicates the food

labeling. Section 22 stands for labeling of spices, flavorings, colorings, and chemical preservatives. Similarly, you will find other regulations also. So, whatever is meant for human consumption and drugs, it will be the CFR; they have their own set of regulations and standards, and it will be given on their website.

Now, food safety, nutrition, security, and sustainability are interlinked. So, we have seen that we have international standards and each nation has their own standards. In the standards, they have set limits. That means the microbial count should be this much, or the heavy metal should be this much, or the protein content should be this much, or the fat content should be so. Everything has the limits has been set clearly, and it's the

responsibility of the producer to see that the limits are met. So rather than meeting the limits, why can't we have a system where we can prevent it, where we can see that it is maintained in the initial phase itself, rather than going to the end product? We have to do it in the first stage. Quality assurance and quality control throughout the process, and at the initial steps, if it can be done, then the end product definitely will be within the limits. So that is the idea now, and in this thing, the four parameters like safety, nutrition, security, and sustainability have to be taken into consideration, and these are linked together. Quality assurance and quality control start from the beginning, that is from the capture or from the procurement of the food product till it reaches the consumer, that is processing, distribution, everything throughout the chain if the quality is maintained, then we can ensure the end product is safe and healthy.

Now, quality assurance and quality control. Therefore, this idea is coming up now, and quality assurance is a planned and systematic activity, which is implemented within the quality system, and it is implemented mainly with the idea of maintaining quality. So, for example, if you can look at the figure here,



the workers they are wearing head caps, they are wearing masks, they are wearing gloves. So, that is part of the quality assurance. In the company and the processing line, if they are not talking to each other, they are doing the

work thoroughly, and they are not touching it directly. So, nothing is getting contaminated from their hand, they are putting the head caps here will not fall, or they are also using the mask. This all ensures the quality assurance. So, if we can ensure from the initial stage, then we can ensure that the product is safe and it is within the limits and it is matching to the standards that has been laid by the governments.

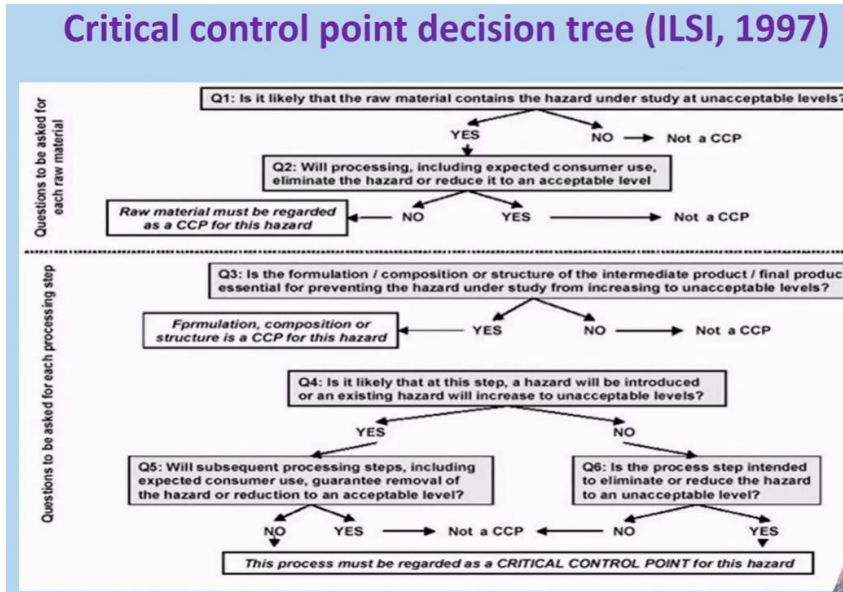
Now, we have different certification schemes to ensure food safety and quality assurance, and one of the most prominent ones is HACCP certification. We also have GMP, then MESTI, MESTI is commonly used in Malaysia, and ISO again, it is commonly available in India we are using it. So, we follow all these systems to ensure that the food product is safe and not only safe, the quality is assured. For this, we have to adopt the schemes. Now, HACCP stands for Hazard Analysis Critical Control Point. In the previous section, we had seen that there are different types of hazards: physical hazard, chemical hazard, and biological hazards. All these hazards are addressed in this scheme, and they ensure that the quality is assured or maintained in the business. So, HACCP has seven principles and 12 procedures.

This is generally followed in the system, and the seven principles are like: first, we have to analyze the hazard. So, if you are producing a product in the company, you have to identify your product and see what are the common hazards that can happen so that you can prevent them and determine the CCPs, that is critical control points, and then set management standards. For example, if cooking is a critical control point, then set your temperature and the time. So that, time temperature will be the standards and monitor it regularly. So, that will be the fourth principle, and monitoring it, seeing that the processing line or the processor is following the same standard. If we are putting the standard as 70 and cooking is done at 75 or 60, then the management is not working properly. So, it has to be monitored regularly.

And if it is not monitored for some reasons, a mistake is happening, then improvement measures need to be taken. It might be the problem with the setting or the equipment. So, if in that case, the improvements need to be adopted, and it has to be seen that the companies are following or they are sticking to the standards they have put, and then verifying it and keeping records. These are the seven principles of the HACCP, and along with this, five more steps have been added.

For doing this hazard analysis, we need to have a team, and the team comprises of different people from different areas. You describe the product and identify where it is being used, who is going to use the product. It might be meant for infants, it might be meant for adults, or it might be meant for elderly people. So, you have to describe for

whom it is meant and create a manufacturing process list. So, this is how a flowchart needs to be designed, which indicates how it is being processed, and on-site confirmation of the process list has to be done. So, along with the principles, we also have to follow these steps. These 12 steps indicate the procedures. So, this is how the HACCP is being done in a company, and this shows the critical control point decision tree.



Actually, for determining the critical control point, we have a decision tree. Here, you have to ask questions at every point, and if the answer is yes, again you have to, for example, is it likely that the raw material

contains the hazard under study at unacceptable levels? If it is yes, then we have to ask another question: will processing, including expecting consumer use, eliminate the hazard or reduce it to the acceptable level? If it is yes, then it is not a CCP, but if it is no, then you have to set standard here and call it as a CCP and see that it is monitored and verified regularly. So, similarly, the tree has to be designed for each and every product, and standards have to be designed for each CCP.

Now, benefits of HACCP certification, this will control hygiene and hazards. HACCP is not meant only for the product; it is also meant for the company and the personnel. So, hygiene will also be taken care of, and it also improves the food safety. It mitigates the risk of product liability claims. It demonstrates due diligence. People will be aware of it; they will be contributing and they will be actively participating in it. HACCP certification will also earn international recognition. People will be able to market their product in the international market. It will also boost consumer confidence. So, these are the different benefits of HACCP certification.

And next, we have to see GMP, and GMP stands for Good Manufacturing Practices. So, again here we have a set of regulations, codes, and guidelines. In GMP, the standards are not there. So, only we have to ensure that the regulations which have been laid are followed or not. So, actually, GMP is an integral part of HACCP. If GMP is taken care of, then it's like 50 percent of the work has been done. So, in GMP, we concentrate on hygiene during production, quality management, then suitable facilities, and trained and qualified personnel are very important for GMP. If there are any complaints, the complaints need to be addressed; any default in the product needs to be recalled, and traceability is also an important factor in GMP. So, all these things together form the GMP, and GMP is an integral part of HACCP. So we have to follow GMP when we do the HACCP certification system.

ISO 22000 is also a food safety and quality management system. ISO 22000 is an international standard FSMS 2005, and it's a complete food safety and quality management system which comprises all the systems we had seen earlier, including GMP, SSOP, HACCP, and quality management system. So, it's a compiled system where we have all the systems together, and it also maps out the organization regardless of its size and position in the food chain. ISO needs to be followed in the industry, and it ensures or demonstrates that the control is followed so that food safety can be ensured.

Recently, in 2021, a joint publication was published by ISO and United Nations Industrial Development Organization, which is a compiled book giving a practical idea about the different food safety management systems that have to be followed in the organization setup and which will ensure safe and quality food. This compiled book is based on ISO 22000:2018.

And now coming to the value addition and value-driven. So, after going through the laws and regulations set internationally and nationally, we can understand that regulations for value-added products or value-driven products are limited, and now countries are coming up with regulations for value-added products. And in the case of fisheries, we have to give importance to sustainability, marketing, and sales. It is not only the product quality or safety; it is also how it has been caught or if it doesn't have any impact on nature and how it is marketed and sold. So, these parameters also need to be addressed.



Value-added can be defined as the foods that are produced and marketed using attributes other than inherent nutritional or food characteristics. So, by value-added food, we mean what kind of improvements have been done in the product and how it can be marketed. So, it has some inherent food quality parameters, but along with that, what are the other changes that have been done. This may include changes during harvesting, production, or processing, or social aspects of workforce management practices. And it may also include other attributes like where it has been taken or the product has been collected. So, all these need to be addressed.

And again, sustainability is an important issue. In the case of fisheries, we have bodies like Marine Stewardship Council, FAO, Responsible Fisheries Management, Alaska Seafood Marketing Institute, all these are coming together to give a sustainable value-driven product. Now companies have their own sustainability programs; they can also go for third-party certification. So, you can have your own internal sustainability program, or you take help of third party. And MSC is the oldest sustainability program, which ensures sustainable fishing and seafood traceability and it is associated with major fisheries organizations. Under this, we have 2366 fishery products, and it is growing. Actually, MSC is adopted or recognized by the consumer. So, it has to be put in the label. 23% of the consumers prefer to have MSC labeling, and consumer interest is increasing because it provides higher quality and also greener distribution. So not only the sustainability, the organic or the greener concept is also coming up, but the bottleneck that the small industries or the mid-size industries they face is the distribution. They might be developing the product, but how to distribute it, how to market it, that is a difficulty they are facing right now, and which also needs to be addressed.

And seafood, it's the first industry sector in which the label contains country of origin. So, it is the first product because it's a highly traded product; this concept of traceability was adopted in the case of seafood and it came under the Country-of-Origin Labeling (COOL) Act.

Now, we have seen there are regulations for food products or the value-added products, fishery products or the byproducts which are coming out from the industry. So, product-wise or item-wise standards or regulations are set. But when a fish is captured or cultured, these standards need to be followed. So, we have EIS standard which assesses

the environmental impact. We have CRC notification, so it should not be in the coastal zone. We have bodies at the local government level, state level, and central level. And all these bodies they contribute directly or indirectly to the standard. So, fisheries, you cannot say that it is an independent one, the fishery sector they have to follow these standards also the regulations and the standards put forth by these agencies.

And then they have the product which is reaching to the consumer that also needs to be taken care of. So, everything, it is not only the regulations regarding the food and the end product, these regulations are also equally important.

So, with this, we have come to the end of this session. And we also wind up the course here. In this course, we have learned a lot about canning and different processing techniques, the spoilage conditions, the value addition of the products, and how spoilage can be prevented, how value addition can be done, and what are the legal aspects that need to be considered when we adopt a product or when we market a product.

Thank you and best wishes to all the students.